



COMMUNITY DEVELOPMENT AUTHORITY OF THE CITY OF MADISON

REQUEST FOR BIDS

Project Title:	Village on Park Parking Structure and Site Work
RFB Identifier:	RFB 12006-0-2023-JW
Address:	2300 S. Park Street, Suite 600, Madison WI 53713
SBE Goal:	8%
RFB Issue Date:	July 27, 2023
Project Tour:	10:30am on Thursday, August 10, 2023 at 2300 South Park St. Meet in the Atrium Lobby. This meeting is optional.
Construction Drawings Questions Due:	August 17, 2023
Addendum of Questions Posted:	On or before August 24, 2023
Bid Bond or Certified Cashier	
Check Due to City Finance	2:00 p.m. on August 31, 2023
Bid Package Submission Deadline:	2:00 p.m. on August 31, 2023
Bid Packages Opened:	After Bid Package Submission Deadline
Parties Notified:	September 5, 2023
CDA Board Approval:	September 7, 2023
SBE Pre-Bid Meeting:	

Small Business Enterprise Pre-Bid Meetings are not being held in person. Contractors can schedule one-on-one phone calls with Bilingual Contract Compliance Specialist Jesus Sanchez, Affirmative Action Division, to count towards good faith efforts. Jesus Sanchez may be reached at jsanchez-cruz@cityofmadison.com.

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Section I: BIDDING REQUIREMENTS

A. Invitation to Bid

The Community Development Authority of the City of Madison (the “CDA”) will receive electronic Bid Package submittals from **general contractors only* (the “Bidder”)** to perform the Scope of Services defined herein (the “Project”) until 2:00 p.m. on Thursday, August 31, 2023.

*It is the intent of the CDA to hire one competent and qualified general contractor to perform the Scope of Services, and will not accept bids from subcontractors.

PROJECT LOCATION:

The work will occur at the Village on Park located at 2300 S. Park Street, 808 Hughes Place, and 2328 S. Park Street (the “Property”).

PROJECT SCOPE:

The Project involves work related to two separate related jobs: (i) the development of a new six- level parking structure (“**Parking Structure**”) and central site work (collectively “**Structure Site Work**”); and (ii) structural roof alteration work to the adjacent grocery store to the new parking structure, the restoration of disturbed areas and new door installation (“**Grocery Alteration Work**”) collectively the “**Project**”. The Project involves broad disciplines, including but not limited to: general construction, site demolition, associated underground structures and utilities, and construction of paving, sidewalks, landscaping, site work, structural work, mechanical work, electrical work, plumbing work, and similar items.

PROJECT TIMELINE:

The Grocery Alteration Work needs to commence as soon as after the Contract is executed since the existing door is adjacent to the Parking Structure site. The new door facing the east needs to be installed before the existing door is sealed off. This work can occur while the grocery tenant is in the space.

In addition, the roof structural support work in the grocery store will need to occur once the tenant vacates the space on August 31, 2023, and the ceiling/disturbed areas should be restored in an expedited manner so the new grocery tenant can occupy the space.

The Scope of Services as described below and in the attached “Contract” should be substantially completed by December 31, 2024 (the “**Substantial Completion Date**”) or later with approved extensions. If the Scope of Services are revised during this “**Bid Process**”, then an addendum to the RFB will be posted on or before August 24, 2023 on Demand Star and Vendor Net, and the Substantial Completion Date may be changed and noted therein. Any questions relating to this RFB, the Project’s Construction Drawings, Specifications and project manual (defined in Section II.C) prepared by Graef-USA Inc. (the “Architect”), the Contract (including any questions on Extra Services as defined therein) or Bid Documents are due on or before August 31, 2023.

It is the Bidder’s responsibility to monitor Demand Star or Vendor Net during the Bidding Process for important updates or addendums. All Bidder’s will be asked to sign A sworn affidavit with their “Bid Package” submittal relating to any addendums being incorporated into the Scope of Services.

OBTAINING RFB:

Electronic files of this Request for Bid (“RFB”) document may be obtained beginning July 27th, 2023. The RFB will be available electronically on www.demandstar.com and <https://vendornet.wi.gov/>.

PRE-BID CONFERENCE/PROJECT TOUR:

A pre-bid conference and Project tour will be held on August 10, 2023 at 10:30am in the Atrium lobby and community room located at 2300 S. Park Street, at which time questions regarding the RFB will be entertained. A tour of the Property will immediately follow the pre-bid conference. All prospective Bidders are strongly encouraged to attend. This meeting is optional.

SBE PRE BID MEETING:

Small Business Enterprise Pre-Bid Meetings are not being held in person. Contractors can schedule one-on-one phone calls with Bilingual Contract Compliance Specialist Jesus Sanchez, Affirmative Action Division, to count towards good faith efforts.

Jesus Sanchez may be reached at jsanchez-cruz@cityofmadison.com.

BID GUARANTY:

Each Bidder must EMAIL a surety company Bid Bond (see attached form) or MAIL a certified cashier’s check payable to the order of the Community Development Authority

for a sum not less than five percent (5%) of the Bidder's total Bid Amount in the Bid Form (the "**Bid Deposit**") that will be held until a Successful Bidder is notified.

There are the three choices for meeting the Bid Bond requirement.

1. The Bid Bond can be submitted in the form of a certified check.
2. Paper Bid Bond (City of Madison form).
3. Biennial Bid Bond on file with the City of Madison.

The Bidder's Bid Bond Form may be included with the Bid Package emailed to Brian Pittelli. A Bidder's certified cashier's check must be received by City Finance at the below address on or before **August 31, 2023 by 2:00 p.m.**

City of Madison Finance Department
c/o Brian Pittelli
City-County Building
210 Martin Luther King Jr. Blvd., Room 406
Madison, WI 53703

The City-County Building is not accepting any walk-in deliveries to the City Finance office; therefore it is highly advised to use a mail service for a certified check delivery that can guaranty delivery on or before **August 31, 2023 by 2:00 p.m.**, or if necessary hand deliver a certified cashier's check (with the envelope addressed to Brian Pittelli) to the front desk clerk in the main lobby at the City County Building located at 210 Martin Luther King Jr. Blvd. by **2:00 p.m. on August 31, 2023.**

If a Bidder is not chosen as the lowest "Successful Bidder" under this RFB, then your Bid Bond or certified cashier's check will be destroyed by City Finance. The Successful Bidder's Bid Bond or certified cashier's check will be destroyed within forty-eight (48) hours following the Successful Bidder's execution of the Contract and receipt of the Payment and Performance Bond, as required if the Bid Amount exceeds \$100,000.

SOCIAL EQUITY CONTRACT REQUIREMENTS:

The Community Development Authority strongly encourages Minority-Owned (MBEs) and Women-Owned Businesses (WBEs), social and economically disadvantaged business enterprises, HUD Section 3 businesses, and small businesses to submit bids or to participate as subcontractors and suppliers on CDA contracts.

AFFIRMATIVE ACTION NOTICE:

The CDA complies with all City of Madison's Affirmative Action Plan requirements. If the Successful Bidder (the "**Contractor**") employs 15 or more employees and does aggregate annual business with

the City of Madison of \$50,000 or more for the calendar year in which the Contract takes effect, Contractor shall file, within thirty (30) days from the Contract Effective Date and BEFORE RELEASE OF PAYMENT, an Affirmative Action Plan (<https://www.cityofmadison.com/civil-rights/contract-compliance/affirmative-action-plan/vendors-suppliers>) designed to ensure that the Contractor provides equal employment opportunity to all and takes affirmative action in its utilization of applicants and employees who are women, minorities and/or persons with disabilities. The Model Affirmative Action Plan for Vendors, Request for Exemption form, and instructions are available at: <http://www.cityofmadison.com/civil-rights/contract-compliance/vendors-suppliers/forms>, or by contacting a Contract Compliance Specialist at the City of Madison Affirmative Action Division at (608) 266-4910.

Contractor shall also allow maximum feasible opportunities to small business enterprises to compete for any subcontracts entered into pursuant to the Contract.

Job postings: If Contractor employs 15 or more employees, regardless of dollar amount, Contractor must notify the City of Madison of all external job openings at locations in Dane County, WI and Contractor agrees to interview candidates referred by the City or its designee. Job posting information is available at:

<https://www.cityofmadison.com/civil-rights/programs/referrals-and-interviews-for-sustainable-employment-raise-program/raise-job>

RIGHTS RESERVED:

The CDA reserves the right to reject any or all Bid Package proposals, to waive any informalities in the Construction Drawings, Specifications or Bid Process or to cancel in whole or in part this RFB if it is in the best interest of the CDA to do so.

The CDA intends to award a contract based on the lowest TOTAL Bid Amount, and most competent and qualified Bidder in a single Contract for all Scope of Services work to be performed.

Per the CDA's Financial Policies, a **competent bidder** is one who meets the following conditions:

1. Maintains a permanent place of business.
2. Provides an Affidavit of Financial Resources, which evidences the Bidder has adequate financial resources to complete the work being Bid, as well as all other work the Bidder is presently undercontract to complete.
3. Is bondable for the terms of the proposed Contract, if required.

4. Has a record of satisfactorily completing past projects.
5. Established and diligently maintained a satisfactory affirmative action program in accordance with the contract provisions. (Adapted from State of Wisconsin Department of Administration Administrative Code Chapter ADM21)

Per the CDA's Financial Policies, a **qualified bidder** is one who 1) has completed one or more projects of similar size or value to the Scope of Services work being bid and 2) has access to all necessary equipment and has organizational capacity and technical competence necessary to enable performance of the work properly and expeditiously. (Adapted from State of Wisconsin Department of Administration Administrative Code Chapter ADM21).

QUESTIONS:

Administrative and technical questions regarding the RFB, Construction Drawings, Specifications, Scope of Services, or other documents may be directed in writing to: Brian Pittelli in the City of Madison Finance department at bpittelli@cityofmadison.com, and to Jim Whitney in City Engineering at jwhitney@cityofmadison.com.

INTERPRETATION OR CORRECTION OF BID DOCUMENTS:

Should the Bidder find any discrepancies, omissions, ambiguities or conflicts during the examination of the Construction Drawings, this RFB and its attachments or after the visit to the Project site then the Bidder should email any questions to Brian Pittelli in the City of Madison Finance department at bpittelli@cityofmadison.com, and to Jim Whitney in City Engineering at jwhitney@cityofmadison.com, no later than August 17, 2023.

The Architect and CDA will review any questions, and where information sought is not clearly indicated or specified, the City of Madison Finance Department will issue a clarifying Addendum to the RFB by August 24, 2023. Included in the Addendum will be a sworn affidavit form for the Bidder to sign acknowledging its receipt thereof, which will then need to be included in the Bidder's Bid Package submittal.

Neither the CDA nor the Architect will be responsible for any oral instructions, interpretations, corrections or changes additions to or deductions from the amount of work required under the Contract.

SBE SMALL BUSINESS ENTERPRISE:

1.1 Policy and Goal

The City of Madison reaffirms its policy of nondiscrimination in the conduct of City business by maintaining a procurement process which remains open to all who have the potential and ability to sell goods and services to the City. It is the policy of the City of Madison to allow Small Business Enterprises (SBE) maximum feasible opportunity to participate in City of Madison contracting. The Bidder acknowledges that its Bid has been submitted in accordance with the SBE program and is for the public's protection and welfare.

Please refer to this "REQUEST FOR BIDS" for the goal for the utilization of SBEs on this Project. SBEs may participate as subcontractors, vendors and/or suppliers, which provide a commercially useful function. The dollar value for SBE suppliers or 'materials only' vendors shall be discounted to 60% for purposes of meeting SBE goals.

A Bidder which achieves or exceeds the SBE goal will be in compliance with the SBE requirements of this Project. In the event that the Bidder is unable to achieve the SBE goal, the Bidder must demonstrate that a good faith effort to do so was made. Failure to either achieve the goal or demonstrate a good faith effort to do so will be grounds for the Bidder being deemed a non-responsible contractor ineligible for award of this Contract.

A Bidder may count towards its attainment of the SBE goal only those expenditures to SBEs that perform a commercially useful function. For purposes of evaluating a Bidder's responsiveness to the attainment of the SBE goal, the contract participation by an SBE is based on the percentage of the total Bid Amount proposed by the Contractor. The total Bid Amount is inclusive of all addenda.

Work performed by an SBE firm in a particular transaction can be counted toward the goal only if it involves a commercially useful function. That is, in light of industry practices and other relevant considerations, does the SBE firm have a necessary and useful role in the transaction, of a kind for which there is a market outside the context of the SBE Program, or is the firm's role a superfluous step added in an attempt to obtain credit towards goals? If, in the judgment of the Affirmative Action Division, the SBE firm will not perform a commercially useful function in the transaction, no credit towards goals will be awarded.

The question of whether a firm is performing a commercially useful function is completely separate from the question of whether the firm is an eligible SBE. A

firm is eligible if it meets the definitional criteria and ownership and control requirements, as set forth in the City of Madison's SBE Program.

If the City of Madison determines that the SBE firm is performing a commercially useful function, then the City of Madison must then decide what that function is. If the commercially useful function is that of an SBE vendor / supplier that regularly transacts business with the respective product, then the City of Madison will count 60% of the value of the product supplied toward SBE goals.

To be counted, the SBE vendor / supplier must be engaged in selling the product in question to the public. This is important in distinguishing an SBE vendor / supplier, which has a regular trade with a variety of customers, from a firm which performs supplier-like functions on an ad hoc basis or for only one or two contractors with whom it has a special relationship.

A supplier of bulk goods may qualify as an eligible SBE vendor / supplier if it either maintains an inventory or owns or operates distribution equipment. With respect to the distribution equipment; e.g., a fleet of trucks, the term "operates" is intended to cover a situation in which the supplier leases the equipment on a regular basis for its entire business. It is not intended to cover a situation in which the firm simply provides drivers for trucks owned or leased by another party; e.g., a prime contractor, or leases such a party's trucks on an ad hoc basis for a specific job.

If the commercially useful function being performed is not that of a qualified SBE vendor / supplier, but rather that of delivery of products, obtaining bonding or insurance, procurement of personnel, acting as a broker or manufacturer's representative in the procurement of supplies, facilities, or materials, etc., only the fees or commissions will apply towards the goal.

For example, a business that simply transfers title of a product from manufacturer to ultimate purchaser; e. g., a sales representative who re-invoices a steel product from the steel company to the Contractor, or a firm that puts a product into a container for delivery would not be considered a qualified SBE vendor / supplier. The Contractor would not receive credit based on a percentage of the cost of the product for working with such firms.

Concerning the use of services that help the Contractor obtain needed supplies, personnel, materials or equipment to perform a contract: only the fee received by the service provider will be counted toward the goal. For example, use of a

SBE sales representative or distributor for a steel company, if performing a commercially useful function at all, would entitle the Contractor receiving the steel to count only the fee paid to the representative or distributor toward the goal. This provision would also govern fees for professional and other services obtained expressly and solely to perform work relating to a specific contract.

Concerning transportation or delivery services: if an SBE trucking company picks up a product from a manufacturer or a qualified vendor / supplier and delivers the product to the Contractor, the commercially useful function it is performing is not that of a supplier, but simply that of a transporter of goods. Unless the trucking company is itself the manufacturer or a qualified vendor / supplier in the product, credit cannot be given based on a percentage of the cost of the product. Rather, credit would be allowed for the cost of the transportation service.

The City is aware that the rule's language does not explicitly mention every kind of business that may contribute work on this Project. In administering these programs, the City would, on a case-by-case basis, determine the appropriate counting formula to apply in a particular situation.

1.2 Contract Compliance

Questions concerning the SBE Program shall be directed to the Contract Compliance Officer of the City of Madison Department of Civil Rights, Affirmative Action Division, 210 Martin Luther King, Jr. Blvd., Room 523, Madison, WI 53703; telephone (608) 266-4910.

1.3 Certification of SBE by City of Madison

The Affirmative Action Division maintains a directory of SBEs which are currently certified as such by the City of Madison. Contact the Contract Compliance Officer as indicated in Section 1.2 to receive a copy of the SBE Directory or you may access the SBE Directory online at www.cityofmadison.com/civil-rights/contract-compliance/targeted-business-enterprise-programs/targeted-business-enterprise.

All contractors, subcontractors, vendors and suppliers seeking SBE status must complete and submit the **Targeted Business Certification Application** to the City of Madison Affirmative Action Division by the time and date established for receipt of bids. A copy of the Targeted Business Certification Application is available by contacting the Contract Compliance Officer at the address and telephone indicated in Section 1.2 or you may access the Targeted Business

Certification Application online at www.cityofmadison.com/civil-rights/contract-compliance/targeted-business-enterprise-programs/targeted-business-enterprise. Submittal of the Targeted Business Certification Application by the time specified does not guarantee that the applicant will be certified as a SBE eligible to be utilized towards meeting the SBE goal for this Project.

1.4 Small Business Enterprise Compliance Report

1.4.1 Good Faith Efforts

Bidders shall take all necessary affirmative steps to assure that SBEs are utilized when possible and that the established SBE goal for this Project is achieved. A contractor who self performs a portion of the work, and is pre-qualified to perform that category of work, may subcontract that portion of the work, but shall not be required to do so. When a Bidder is unable to achieve the established SBE goal, the Bidder must demonstrate that a good faith effort to do so was made. Such a good faith effort should include the following:

- 1.4.1.1 Attendance at the pre-bid meeting.
- 1.4.1.2 Using the City of Madison's directory of certified SBEs to identify SBEs from which to solicit bids.
- 1.4.1.3 Assuring that SBEs are solicited whenever they are potential sources.
- 1.4.1.4 Referring prospective SBEs to the City of Madison Affirmative Action Division for certification.
- 1.4.1.5 Dividing total project requirements into smaller tasks and/or quantities, where economically feasible, to permit maximum feasible SBE participation.
- 1.4.1.6 Establishing delivery schedules, where requirements permit, which will encourage participation by SBEs.
- 1.4.1.7 Providing SBEs with specific information regarding the work to be performed.
- 1.4.1.8 Contacting SBEs in advance of the deadline to allow such businesses sufficient time to prepare a bid.
- 1.4.1.9 Utilizing the bid of a qualified and competent SBE when the bid of such a business is deemed reasonable (i.e. 5% above the lowest Bidder), although not necessarily low.
- 1.4.1.10 Contacting SBEs which submit a bid, to inquire about the details of the bid and confirm that the scope of the work was interpreted as intended.
- 1.4.1.11 Completion of Cover Page (page C-6), Summary Sheet (page C-7) and SBE Contact Reports (pages C-8 and C9) if applicable.

1.4.2 Reporting SBE Utilization and Good Faith Efforts

The Small Business Enterprise Compliance Report is to be submitted by the Bidder with the Bid: This report is due by the specified Bid closing time and date. Bids submitted without a completed SBE Compliance Report as outlined below may be deemed non-responsible and the Bidder ineligible for award of this contract. Notwithstanding any language to the contrary contained herein, the City may exercise its discretion to allow Bidders to correct or supplement submissions after Bid opening, if the minor discrepancy, Bid irregularity or omission is insignificant and not one related to price, quality, quantity, time of completion, performance of the contract, or percentage of SBE utilization.

1.4.2.1 If the Bidder meets or exceeds the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

1.4.2.1.1 **Cover Page**

1.4.2.1.2 **Summary Sheet**

1.4.2.2 If the Bidder does not meet the goal established for SBE utilization, the Small Business Enterprise Compliance Report shall consist of the following:

1.4.2.2.1 **Cover Page**

1.4.2.2.2 **Summary Sheet**

1.4.2.2.3 **SBE Contact Report** (A separate Contact Report must be completed for each applicable SBE which is not utilized.)

1.5 Appeal Procedure

A Bidder which does not achieve the established goal and is found non-responsible for failure to demonstrate a good faith effort to achieve such goal and subsequently denied eligibility for award of contract may appeal that decision to the Small Business Enterprises Appeals Committee. All appeals shall be made in writing, and shall be delivered to and received by the City Engineer no later than 4:30 PM on the third business day following the Bidder's receipt of the written notification of ineligibility by the Affirmative Action Division Manager. Postmark not acceptable. The notice of appeal shall state the basis for the appeal of the decision of the Affirmative Action Division Manager. The Appeal shall take place in accordance with Madison General Ordinance 33.54.

1.6 SBE Requirements After Award of the Contract

The Successful Bidder shall identify SBE subcontractors, suppliers and vendors on the subcontractor list in accordance with the specifications. The Contractor shall submit a detailed explanation of any variances between the listing of SBE subcontractors, vendors and/or suppliers on the subcontractor list and the Contractor's SBE Compliance Report for SBE participation.

No change in SBE subcontractors, vendors and/or suppliers from those SBEs indicated in the SBE Compliance Report will be allowed without prior approval from the Engineer and the Affirmative Action Division. The contractor shall submit in writing to the City of Madison Affirmative Action Division a request to change any SBE citing specific reasons which necessitate such a change. The Affirmative Action Division will use a general test of reasonableness in approving or rejecting the contractor's request for change. If the request is approved, the Contractor will make every effort to utilize another SBE if available.

The City will monitor the Project to ensure that the actual percentage commitment to SBE firms is carried out.

1.7 SBE Definition and Eligibility Guidelines

A Small Business Enterprise is a business concern awarded certification by the City of Madison. For the purposes of this program a Small Business Enterprise is defined as:

- A. An independent business operated under a single management. The business may not be a subsidiary of any other business and the stock or ownership may not be held by any individual or any business operating in the same or a similar field. In determining whether an entity qualifies as a SBE, the City shall consider all factors relevant to being an independent business including, but not limited to, the date the business was established, adequacy of its resources for the work in which it proposes to involve itself, the degree to which financial, equipment leasing and other relationships exist with other ineligible firms in the same or similar lines of work. SBE owner(s) shall enjoy the customary incidents of ownership and shall share in the risks and profits commensurate with their enjoyment interests, as demonstrated by an examination of the substance rather than form or arrangements that may be reflected in its ownership documents.
- B. A business that has averaged no more than \$4.0 million in annual gross receipts over the prior three year period and the principal owner(s) do not have a personal net worth in excess of \$1.32 million.

Firm and/or individuals that submit fraudulent documents/testimony may be barred from doing business with the City and/or forfeit existing contracts.

SBE certification is valid for one (1) year unless revoked.

B. Instructions to Bid

BID DOCUMENTS TO INCLUDE IN YOUR BID PACKAGE SUBMITTAL:

All the following documents included in Section II hereof (collectively the “**Bid Documents**”) must be completed, executed, notarized (where stated) and submitted with an electronic “**Bid Package**”:

1. Bid Form*
2. Bid Bond Form, or a certified cashier’s check for the Bid Deposit mailed or delivered separately per the above instructions.
3. Contractor Profile
4. Contractor References
5. Affidavit of Financial Resources
6. If an Addendum to the RFB is issued, the sworn affidavit therein will need to be signed and included in the Bid Package.
7. SBE Forms

*The attached Bid Form must be filled out and executed by an authorized party within the firm that is presenting a Bid Amount or the person who signed the Affidavit of Financial Resources.

The guaranteed maximum Bid Amount (the “**Bid Amount**”) shall include but is not limited to the following costs to perform the Project’s Scope of Services: all labor; permit fees (including building permit fees and water service fees); parts; materials; tools; supplies; equipment; crane rental; demolition; mechanical, electrical and plumbing services; trash bin and disposal costs; rest room supplies; cleaning services; insurance costs; bonds; contingency, and other facilities necessary or proper for, or incidental to, all work as required by, and in accordance with the Contract.

MG&E electrical utility charges associated with providing the new electrical service will be paid by the CDA.

A Bid Amount breakdown by subcontractor also needs to be filled out in the Bid Form.

BID PACKAGE SUBMITTAL PROCEDURE:

A complete Bid Package (except for a Bid Deposit which is mailed or delivered per the above instructions) submitted for this Project must be sent electronically to Brian Pittelli in the City of Madison Finance department at bpittelli@cityofmadison.com.

Please note Brian has two “t’s” and two “l’s” in his name/email address.

When submitting the Bid Package, it must be labeled in the subject line of the email to Brian Pittelli as follows:

Bid Package RFB 12006-0-2023-JW and then reference the Bidder’s company name afterwards

BID PACKAGE SUBMITTAL DEADLINE:

The submission deadline for the Bid Package is 2:00 p.m. on August 31, 2023. Thereafter, all Bid Packages will be emailed by Brian Pittelli to Jim Whitney at the City of Madison and Dan Windorski at Graef-USA Inc. for their review.

Bid Packages missing any Bid Documents or received after 2:00 p.m. may not be accepted by the CDA, in its sole discretion.

C. Scope of Services and Construction Drawings/Specifications

The Scope of Services that are outlined below, and in the below Construction Drawings and Specifications will be attached to the Contract, as Attachments 2 and 3, respectively, as well as the other Attachments below for reference purposes.

The attachments to the Scope of Services and Contract are as follows:

- Attachment No. 1: 1-page Key Site Plan dated 4/7/23
- Attachment No. 2: 156-page Construction Drawings dated 7/28/2023
- Attachment No. 3: 711-page Project Manual Specifications dated 7/28/2023
- Attachment No. 4: 1-page South Transfer Station Staging Plan dated 3/27/23
- Attachment No. 5: 3-page WDNR Storm Water Runoff Permit dated April 27, 2023
- Attachment No. 6: 2-page Erosion Control Permit dated 4/27/2023
- Attachment No. 7: 2-page Stormwater Management Permit dated 4/27/2023
- Attachment No. 8: 15-page Erosion Control-Stormwater Notes dated 4/27/2023
- Attachment No. 9: 2-page Sanitary Sewer Plug Permit dated 5/12/2023
- Attachment No. 10: 2-page Storm Sewer Plug Permit dated 5/12/2023

Attachment No. 11: 4-page Sidewalk Plan & Profile Drawing dated 6/13/2023
Attachment No. 12: 4-page Application to Excavate in Public Right-Of-Way Checklist
Attachment No. 13: 1-page BI Plan Approval Letter - 808 Hughes Pl dated 7/17/2023
Attachment No. 14: 1-page BI Plan Approval Letter – 2328 S Park St date 6/28/2023

Contractor (and its subcontractors where applicable) is to:

1. Perform work related to general construction, building demolition, site work, electrical work, plumbing work, and similar items on the Property as outlined in the Construction Drawings and Specifications that are attached to this RFB.
2. All contractors and subcontractors performing work in the public right-of-way are required to be prequalified with the City of Madison. Refer to Attachment 11, Sidewalk Plan & Profile. Prequalification forms are available on the City's website at:
<https://www.cityofmadison.com/engineering/developers-contractors/contractors/how-to-get-prequalified>
3. The contractor will be required to obtain a city permit to excavate in the right of way and a sidewalk permit. Refer to Attachment 11, Sidewalk Plan & Profile.
4. Contractor will communicate/coordinate work with the Architect, the CDA's designated representative and the CDA's property manager (Jamah Johnson).
5. The CDA will be providing the building permits plan review, stormwater management permit, erosion control permit, WDNR stormwater runoff permit, and storm subsurface plumbing system approval. The Contractor is responsible for any other permits relating to the Scope of Services work. There will be two building permits required, one for 808 Hughes Place for the Parking Structure, and one for 2328 South Park Street for the Grocery Alteration Work. These projects are combined into one set of plans.
6. Contractor shall follow all requirements outlined in the Construction Drawings, Specifications and Contract prior to commencing construction.
7. Contractor will schedule a pre-construction meeting with the Architect, the CDA, the CDA's designated representative, and any subcontractors engaged by Contractor within ten days from the Contract's Effective Date. At this meeting, Contractor shall provide a construction schedule, submittal log, and schedule of values.

8. Contractor and its subcontractors shall only park in the designated area at the "Metro South Transfer Station" site identified in Attachment 4. There shall be no parking on the Property or Access Health site as noted on Attachment 1, Key Site Plan.
9. The Contractor and its subcontractors shall wear face masks while working in the Property, if required by Public Health of Dane County.
10. In general, the normal working hours at the Property are Monday through Friday from 7:30 a.m. to 5:30 p.m. All shutdowns, tie-ins and various demolition activities producing substantial noise have to be performed outside normal working hours, and each step shall be coordinated with Jamah Johnson.
11. CDA's property management team shall provide an area for staging of materials/equipment per Attachment 4 – South Transfer Station Staging Plan, and Contractor's trash bin in rear alley of the Property. Likewise, CDA's property management team will work to identify an area for Contractor's crane/hoist if needed. The construction staging area at the Metro South Transfer Station has an open grass area on the site that can be used for construction staging of materials and equipment, refer to Attachment No. 4.
12. Upon Substantial Completion of the work, furnish to the CDA the certificate of occupancy, all warranties and maintenance manuals, as-built drawings, and CAD files.
13. Use of tobacco products on site is prohibited.
14. The revenue control equipment will be owner furnished and owner installed by the CDA. The general contractor shall coordinate all work for the revenue control equipment.

Construction Drawings and Specifications

See Attachments 1-14 of RFB 12006-0-2023-JW for all Project Construction Drawings and Specifications. Bidders shall review said attachments and ask any questions to Brian Pittelli, who will forward the questions to the CDA team. Any questions and responses will become part of the Addendum. Please review the Extra Services provisions in the Contract if you feel any scope may qualify as such, and include in your questions.

Section II: BID DOCUMENT FORMS

See the below forms on the following pages to include in your electronic* Bid Package submittal

A. Bid Form

B. Bid Bond Form or Certified Check (A certified check needs to be mailed or delivered per the above instructions)

C. Contractor Profile

D. Contractor References

E. Affidavit of Financial Resources

F. Sworn Affidavit Addendum to RFB, if applicable

G. SBE Forms

RFB 12006-0-2023-JW Bid Form-Two Pages

THIS BID IS SUBMITTED ELECTRONICALLY TO:

City of Madison Finance Department

c/o Brian Pittelli

bpittelli@cityofmadison.com

1. The Undersigned Bidder offers and agrees, if this Bid is accepted, to enter into an agreement with the CDA in the form included in the Contract (which is a sample that will be tailored to this RFB), and to complete all Work as specified or indicated in the Scope of Services section in the Contract for the Contract Amount within the Contract Time.

2. BIDDER has examined and familiarized the Invitation to Bid, Instructions to Bid, the Scope of Services, Construction Drawings and Specifications, Bid Documents, the sample Contract and any other associated forms and documents thereto; familiarized themselves with the local conditions affecting the cost of the work; familiarized themselves with the legal requirements (federal, state, and local laws, wage requirements, ordinances, rules, and regulations) that they have made such independent investigations as they deem necessary; and that they have satisfied themselves to all conditions affecting cost, progress, or performance of the Scope of Services.

3. BIDDER will upon the CDA's acceptance of this Bid will: execute the Contract, furnish the required insurance certificate and send a Performance and Payment Bond to the CDA, all within 10 days after the award of the Contract.

4. BIDDER agrees to include in its below Bid Amount all costs to complete the Scope of Services, which includes but is not limited to: all labor; permit; parts; materials; tools; supplies; equipment; crane rental; demolition; mechanical, electrical and plumbing services; trash bin and disposal costs; rest room supplies; cleaning services; insurance costs; bonds; profit; sales tax; contingency, and other facilities necessary or proper for, or incidental to, all work as required by, and in accordance with the Contract for the guaranteed maximum lump sum price of _____ Dollars (\$_____) (the "**Bid Amount**"). The Bid Amount will become the Contract Amount in the Contract if the Bidder is awarded this Project. **Please note the CDA is a tax-exempt entity**

CONTINUED ON THE NEXT PAGE

Village on Park RFB 12006-0-2023-JW Bid Form Page 2

A breakdown of Bidder's Bid Amount is as follows (please print clearly):

	Subcontractor(s)	Dollar Amount
1. General Construction		
2. Sitework/Civil		
3. Structural		
6. Mechanical HVAC		
5. Electrical		
4. Plumbing		
7. Communications		

TOTAL BID AMOUNT \$ _____

5. The BIDDER's estimated Substantial Completion Date for the Scope of Services work is _____ weeks from the Contract Effective Date. The CDA's Substantial Completion Date is on or before **December 31, 2024**.

6. The BIDDER's parts and labor warranty to correct any Work described in the Construction Drawings is _____ years from the Substantial Completion Date.

7. BIDDER _____ (include on line-is/is not) a prequalified contractor with the City of Madison's Engineering department.

8. BIDDER _____ (include on line-does or does not) need an Affirmative Action Plan as described in Section 13 of the Contract.

Contractor Name/Entity Registered with the State of Wisconsin: _____

Contractor Signature*: _____

Contractor Printed Name: _____

*This individual is authorized to sign on behalf of the Entity bidding on this Project, and is the individual noted in the Affidavit of Financial Resources.

BID BOND

KNOW ALL PARTIES BY THESE PRESENT, THAT Principal and Surety, as identified below, are held and firmly bound unto the Community Development Authority of the City of Madison, (hereinafter referred to as the "Obligee"), in the sum of _____ Thousand and _____ Hundred Dollars (\$_____) (the "Obligation"), which represents five per cent (5%) of the total Bid Amount by the Principal, for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these present.

The conditions of this Obligation are such that, whereas the Principal has submitted to the Obligee a certain Bid-attached hereto (the "Bid Form") and hereby made a part hereof, to enter into a Contract in writing for the general contractor work related to the disconnection of the mechanical, electrical and plumbing systems tied to the Project, and other related services as further described in the following request for bid number:

RFB 12006--0-2023-JW (the "RFB").

1. If said Bid Amount is rejected by the Obligee, then this Obligation shall be void.
2. If said Bid Amount is accepted by the Obligee, the Principal shall execute and deliver a Contract in the form specified by the Obligee in the Bid RFB Packet (properly completed in accordance with said Bid), and shall furnish a Payment and Performance Bond for his/her faithful performance of said Contract, and for the payment of all persons performing labor and furnishing equipment/materials in connection therewith, and shall in all other respects perform the Scope of Services created by the acceptance of said Bid Amount, then this Obligation shall be void.

If said Bid Amount is accepted by the Obligee and the Principal shall fail to execute and deliver the Contract and deliver the Payment and Performance Bond executed by this Surety, or other Surety approved by the Obligee, all within the time specified in the RFB or any extension thereof, the Principal and Surety agree jointly and severally to forfeit to the Obligee as liquidated damages the Obligation sum mentioned above; it being understood that the liability of the Surety for any and all claims hereunder shall in no event exceed the sum of this Obligation as stated, and it is further understood that the Principal and Surety reserve the right to recover from the Obligee that portion of the forfeited sum which exceed the actual liquidated damages incurred by the Obligee.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its bond shall be in no way impaired or affected by an extension of the time within which the Obligee may accept such Bid, and said Surety does hereby waive notice of any such extension.

SIGNATURES FOLLOW ON THE NEXT PAGE

RFB 12006-0-2023-JW BID BOND

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, on the day and year set forth below.

Seal PRINCIPAL

Name of Principal

BY _____

Date _____

Name and Title

Seal SURETY

Name of Surety

BY _____

Date _____

Name and Title

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under National Provider No. _____ for the year 2023, and appointed as attorney in fact with authority to execute this bid bond and the payment and performance bond referred to above, which power of attorney has not been revoked.

Date

Agent Signature

Address

City, State and Zip Code

Telephone Number

NOTE TO SURETY & PRINCIPAL

The Bid Amount submitted, which this bond guarantees shall be rejected if the following instrument is not attached to this bond:

Power of Attorney showing that the agent of Surety is currently authorized to execute bonds on behalf of the Surety, and in the amounts referenced above.

CONTRACTOR PROFILE**1. Proposer/Bidder Company Name:**

2. Form of Organization:	<input type="checkbox"/> Corporation	<input type="checkbox"/> Limited Liability Company	<input type="checkbox"/> General Partnership
	<input type="checkbox"/> Sole Proprietor	<input type="checkbox"/> Unincorporated Association	<input type="checkbox"/> Other: _____

3. FEIN:	OR Social Security Number (if sole proprietorship, provide SSN at time of contract award)
-----------------	---

Dunn and Bradstreet No.

4. Company Address:

Address:	City:	State:	Zip
----------	-------	--------	-----

5. Address of Office servicing CDA Project:

Address	City	State	Zip
---------	------	-------	-----

6. Principal Information & Contact

Name	Title	Phone	Email
------	-------	-------	-------

7. Contact person for questions about your bid/proposal:

Name	Title	Phone	Email
------	-------	-------	-------

8. Mailing Address where CDA purchase orders/contracts are to be mailed, Billing Contact Person:

Contact Name	Title	Phone	Email
--------------	-------	-------	-------

Address	City	State	Zip
---------	------	-------	-----

9. Affirmative Action Contact:

Name	Title	Phone	Email
------	-------	-------	-------

CONTRACTOR PROFILE: REFERENCES

Complete this form if your company has not completed work of similar type and size with the Community Development Authority of the City of Madison in the previous three calendar years.

List four (4) projects in which you, or your firm has/had:

1. Similar involvement (prime contractor, subcontractor)
2. Similar in nature (roofing, paving, construction, etc.)
3. Similar in scope (amount of work, dollar value, complexity, etc.)
4. Completed in the last 5 calendar years

Project Name	Project Address	Project Owner	Owner Phone Number
1.			
2.			
3.			
4.			

AFFIDAVIT OF FINANCIAL RESOURCES

State of Wisconsin)
)ss
County of Dane)

The Undersigned, being first duly sworn on oath, deposes and says that:

1. The Undersigned is the _____ (title) of _____ (the legal entity name of entity "Contractor") is authorized to execute this Affidavit and can legally bind the Contractor to all statements made herein.

The Undersigned is authorized to execute the Contract and all documents related to and resulting from the bid the Contractor submitted to the Community Development Authority of the City of Madison on the ____ day of _____, 2023 relating to **RFB 12006-0-2023-JW (the “RFB”)**.

2. The Contractor has adequate financial resources and employee capacity to complete the Scope of Services work required in the RFB.

Signature: _____

Printed Name: _____

Subscribed and sworn to before me this _____ day of _____, 2023

Notary Public, State of Wisconsin
My Commission expires:

CONTRACT NO. 12006-0-2023-JW

Small Business Enterprise Compliance Report

**This information may be submitted electronically through
or submitted with bid in sealed envelope.**

Cover Sheet

Prime Bidder Information

Company: _____

Address: _____

Telephone Number: _____ Fax Number: _____

Contact Person/Title: _____

Prime Bidder Certification

I, _____, _____ of
Name Title

_____ certify that the information
Company

contained in this SBE Compliance Report is true and correct to the best of my knowledge and belief.

Witness' Signature

Bidder's Signature

Date

CONTRACT NO. 12006-0-2023-JW

Small Business Enterprise Compliance Report

Summary Sheet

SBE Subcontractors Who Are NOT Suppliers

Name(s) of SBEs Utilized	Type of Work	% of Total Bid Amount
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
		%
Subtotal SBE who are NOT suppliers:		_____ %

SBE Subcontractors Who Are Suppliers

Name(s) of SBEs Utilized	Type of Work	% of Total Bid Amount
		%
		%
		%
		%
		%
		%
		%
Subtotal Contractors who are suppliers:		_____ % x 0.6 = _____ % (discounted to 60%)

Total Percentage of SBE Utilization: _____ %.

CONTRACT NO. 12006-0-2023-JW

Small Business Enterprise Compliance Report

SBE Contact Report

Submit separate copy of this form for each SBE which you are not able to utilize towards meeting the SBE goal for this Project. Attach separate sheets if necessary.

SBE Information

Company: _____

Address: _____

Telephone Number: _____

Contact Person/Title: _____

1. Outline below all efforts to solicit a bid from the above SBE. Include date, means of contact, who from your company made this contact and the result.

2. Describe the information provided to the aforementioned SBE regarding the Scope of Services for which he/she was to provide a bid.

Is this the same Scope of Services on which the subcontractor you intend to utilize based his/her bid?

☐ Yes ☐ No

3. Did this SBE submit a bid? ☐ Yes ☐ No

4. Is the General Contractor pre-qualified to self-perform this category of work?

☐ Yes ☐ No

5. If you responded "Yes" to Question 3, please check the items below which apply and provide the requested detail. If you responded "No" to Question 3, please skip ahead to item 6 below.

- ☐ The SBE listed above is unavailable for work on this Project for the following reasons. Provide specific detail for this conclusion.

- ☐ The SBE listed above is unqualified for work on this Project. Provide specific details for this conclusion.

- ☐ The SBE listed above provided a price that was unreasonable (i.e. more than 5% above the lowest bidder). Provide specific detail for this conclusion including the SBE's price and the price of the subcontractor you intend to utilize.

- ☐ A contract with the SBE listed above may constitute a breach of the Bidder's collective bargaining agreements. Provide specific detail for this conclusion including, but not limited to, correspondence from the SBE indicating it will not sign a project labor agreement and/or correspondence from the applicable trade union indicating a project labor agreement will not be allowed at the time of Project bidding.

- ☐ Other; please specify reason(s) other than listed above which made it impossible for you to utilize this SBE on this Project.

6. Describe any other good faith efforts:

Section III: CONTRACTING REQUIREMENTS

If the Bidder is selected by the CDA for this Project, then within ten days of the award of the Project it will need to fill out and return the CDA Contract, a certificate of insurance per the below terms, and provide a Performance and Payment Bond.

A. CDA Contract

See the attached sample Contract on the next page that will be tailored to the Bid.

As noted in the Contract, Bidder/Contractor will need to comply with the insurance requirements outlined in Section B below.

THIS IS A SAMPLE CONTRACT SUBJECT TO CHANGE –THAT NEEDS TO BE
APPROVED BY THE CITY ATTORNEY’S OFFICE AND THE CDA BOARD.



CONTRACT FOR PURCHASE OF SERVICES

RFB 12006-0-2023-JW

between the Community Development Authority of the City of Madison
and _____

1. **PARTIES.**

This is a “Contract” or “Agreement” between the Community Development Authority of the City of Madison, Wisconsin, hereafter referred to as the “CDA” and _____, hereafter referred to as “Contractor”.

The Contractor is a: ☐ Corporation ☐ Limited Liability Company ☐ General Partnership ☐ LLP
(to be completed by Contractor) ☐ Sole Proprietor ☐ Unincorporated Association ☐ Other: _____.

2. **PURPOSE.**

The purpose of this Contract is for the Contractor to perform general contractor work related to the Scope of Services, as set forth in Section 3, at the Village on Park Mall located at 2300 S. Park Street, Madison WI (the “Property”).

The Contractor may use portions of the South Transfer Station site located at 802 W. Badger Road, Madison WI (the “South Transfer site”) per Attachment 4 hereof to stage its construction and store equipment, materials related to the Scope of Services work defined below.

3. **SCOPE OF SERVICES AND SCHEDULE OF PAYMENTS.**

Village on Park Parking Structure and Site Improvements (“Structure Site Work”) and the Alteration Work to Adjacent Grocery Store to New Parking Structure (“Grocery Alteration Work”): The Contractor will perform the scope of services work as described in Attachment 2 per the Construction Drawings, Attachment 3 per the Specifications, and in Attachment 11 per the Sidewalk Plan & Profile (collectively the “Scope of Services”). The attachments to the Contract are as follows:

Attachment No. 1: 1-page Key Site Plan dated 4/7/23
Attachment No. 2: 156-page Construction Drawings dated 7/28/2023
Attachment No. 3: 711-page Project Manual Specifications dated 7/28/2023
Attachment No. 4: 1-page South Transfer Station Staging Plan dated 3/27/23
Attachment No. 5: 3-page WDNR Storm Water Runoff Permit dated April 27, 2023
Attachment No. 6: 2-page Erosion Control Permit dated 4/27/2023
Attachment No. 7: 2-page Stormwater Management Permit dated 4/27/2023
Attachment No. 8: 15-page Erosion Control-Stormwater Notes dated 4/27/2023
Attachment No. 9: 2-page Sanitary Sewer Plug Permit dated 5/12/2023
Attachment No. 10: 2-page Storm Sewer Plug Permit dated 5/12/2023
Attachment No. 11: 4-page Sidewalk Plan & Profile Drawing dated 6/13/2023
Attachment No. 12: 4-page Application to Excavate in Public Right-Of-Way Checklist
Attachment No. 13: 1-page BI Plan Approval Letter – 808 Hughes Pl dated July 17, 2023
Attachment No. 14: 1-page BI Plan Approval Letter – 2328 S Park St dated June 28, 2023

Contractor shall invoice the CDA monthly for work completed per the Scope of Services; see Section 24 for more detail on the basis for payment.

Order of Precedence: In the event of a conflict between the terms of this Contract for Purchase of Services and the terms of any document attached or incorporated herein, the terms of this Contract for Purchase of Services shall control and supersede any such conflicting term.

4. **TERM AND EFFECTIVE DATE.**

This Contract shall become effective upon execution by both parties. The Contract Effective Date is the latest date signed by the CDA. No work shall commence before such time. The Scope of Services shall be completed no later than December 31, 2024, unless both parties agree to amend the Contract per the terms of Section 9.

5. **ENTIRE AGREEMENT.**

This Contract for Purchase of Services, including any and all attachments, exhibits and other documents referenced in Section 3 (hereafter, "Agreement" or "Contract") is the entire Agreement of the parties and supersedes any and all oral contracts and negotiations between the parties. If any document referenced in Section 3 includes a statement that expressly or implicitly disclaims the applicability of this Contract for Purchase of Services, or a statement that such other document is the "entire agreement," such statement shall be deemed rejected and shall not apply to this Contract.

6. **ASSIGNABILITY/SUBCONTRACTING.**

Contractor shall not assign or subcontract any interest or obligation under this Contract without the CDA's prior written approval. All of the services required hereunder will be performed by Contractor and employees of Contractor.

7. **DESIGNATED REPRESENTATIVE.**

- A. Contractor designates _____ as Contract Agent with primary responsibility for the performance of this Contract. In case this Contract Agent is replaced by another for any reason, the Contractor will designate another Contract Agent within seven (7) calendar days of the time the first terminates his or her employment or responsibility using the procedure set forth in Section 15, Notices.
- B. In the event of the death, disability, removal or resignation of the person designated above as the Contract agent, the CDA may accept another person as the Contract agent or may terminate this Agreement under Section 25, at its option.

8. **PROSECUTION AND PROGRESS.**

- A. Services under this Agreement shall commence upon written order from the CDA to the Contractor when it delivers a fully executed Agreement. This order will constitute authorization to proceed, unless another date for commencement is specified elsewhere in this Contract including documents incorporated in Section 3.
- B. The Contractor shall complete the services under this Agreement within the time for completion specified in the Section 3, Scope of Services, including any amendments. The Contractor's services are completed when the CDA notifies the Contractor in writing that the services are complete and are acceptable. The time for completion shall not be extended because of any delay attributable to the Contractor, but it may be extended by the CDA in the event of a delay attributable to the CDA, or in the event of unavoidable delay caused by war, insurrection, natural disaster, or other unexpected event beyond the control of the Contractor. If at any time the Contractor believes that the time for completion of the work should be extended because of unavoidable delay caused by an unexpected event, or because of a delay attributable to the CDA, the Contractor shall notify the CDA as soon as possible, but not later than seven (7) calendar days after such an event. Such notice shall include any justification for an extension of time and shall identify the amount of time claimed to be necessary to complete the work.
- C. Services by the Contractor shall proceed continuously and expeditiously through completion of each phase of the work.
- D. Progress reports documenting the extent of completed services shall be prepared by the Contractor and submitted to the CDA with each invoice under Section 24 of this Agreement, and at such other times as the CDA may specify, unless another procedure is specified in Section 3.
- E. The Contractor shall notify the CDA in writing when the Contractor has determined that the Scope of Services under this Agreement have been completed. When the CDA determines that the Scope of Services are complete and are acceptable, the CDA will provide written notification to the Contractor, acknowledging formal acceptance of the completed Scope of Services. In the event the CDA does not believe Substantial Completion has occurred it will provide Contractor with a punch list it needs to cure as set forth in the Construction Drawings and Specifications.

9. **AMENDMENT.**

This Contract shall be binding on the parties hereto, their respective heirs, devisees, and successors, and cannot be varied or waived by any oral representations or promise of any agent or other person of the parties hereto. Any other change in any provision of this Contract may only be made by a written amendment, signed by the duly authorized agent or agents who executed this Contract.

10. **EXTRA SERVICES.**

The CDA may require the Contractor to perform extra services or decreased services, according to the procedure set forth in Section 24. Extra services or decreased services means services which are not different in kind or nature from the services called for in the Scope of Services, Section 3, but which may increase or decrease the quantity and kind of labor or materials or expense of performing the services. Extra services may not increase the total Contract Price, as set forth in Section 23, unless the Contract is amended as provided in Section 9 above.

11. **NO WAIVER.**

No failure to exercise, and no delay in exercising, any right, power or remedy hereunder on the part of the CDA or Contractor shall operate as a waiver thereof, nor shall any single or partial exercise of any right, power or remedy preclude any other or further exercise thereof or the exercise of any other right, power or remedy. No express waiver shall affect any event or default other than the event or default specified in such waiver, and any such waiver, to be effective, must be in writing and shall be operative only for the time and to the extent expressly provided by the CDA or Contractor therein. A waiver of any covenant, term or condition contained herein shall not be construed as a waiver of any subsequent breach of the same covenant, term or condition.

12.

NON-DISCRIMINATION.

During the performance of work under this Contract, the Contractor agrees not to discriminate against any employee or applicant for employment because of race, religion, marital status, age, color, sex, handicap, national origin or ancestry, income level or source of income, arrest record or conviction record, less than honorable discharge, physical appearance, sexual orientation, gender identity, political beliefs or student status. Contractor further agrees not to discriminate against any subcontractor or person who offers to subcontract on this Contract because of race, religion, color, age, disability, sex, sexual orientation, gender identity or national origin.

13.

AFFIRMATIVE ACTION.

By policy, the CDA has opted to require contractors to comply with the Affirmative Action and Workforce utilization requirements of the City of Madison. Under this Agreement, Contractor shall comply with the following:

A. The following language applies to all contractors employing fifteen (15) or more employees: (MGO 39.02(9)(c).)

The Contractor agrees that, within thirty (30) days after the effective date of this Contract, Contractor will provide to the City of Madison Department of Civil Rights (the "Department"), certain workforce utilization statistics, using a form provided by the City of Madison (the "City").

If the Contract is still in effect, or if the CDA enters into a new agreement with the Contractor, within one year after the date on which the form was required to be provided, the Contractor will provide updated workforce information using a second form, also to be furnished by the City. The second form will be submitted to the Department no later than one year after the date on which the first form was required to be provided.

The Contractor further agrees that, for at least twelve (12) months after the effective date of this Contract, it will notify the Department of each of its job openings at facilities in Dane County for which applicants not already employees of the Contractor are to be considered. The notice will include a job description, classification, qualifications, and application procedures and deadlines shall be provided to the CDA by the opening date of advertisement and with sufficient time for the CDA to notify candidates and make a timely referral. The Contractor agrees to interview and consider candidates referred by the Department, or an organization designated by the Department, if the candidate meets the minimum qualification standards established by the Contractor, and if the referral is timely. A referral is timely if it is received by the Contractor on or before the date stated in the notice.

The Department will determine if the Contractor is exempt from the above requirements (Sec. 13.A) at the time the Request for Exemption in 13.B(2) is made.

B. Articles of Agreement, Request for Exemption, and Release of Payment:

The "ARTICLES OF AGREEMENT" beginning on the following page, apply to all contractors, unless determined to be exempt under the following table and procedures:

NUMBER OF EMPLOYEES	LESS THAN \$50,000 Aggregate Annual Business with the City*	\$50,000 OR MORE Aggregate Annual Business with the City*
14 or less	Exempt**	Exempt**
15 or more	Exempt**	Not Exempt

*As determined by the Finance Director

**As determined by the Department of Civil Rights

(1) **Exempt Status:** In this section, "Exempt" means the Contractor is exempt from the Articles of Agreement in section 13.B.(5) of this Contract and from filing an Affirmative Action plan as required by Section IV of the Articles of Agreement. The Department of Civil Rights ("Department") makes the final determination as to whether a contractor is exempt. If the Contractor is not exempt, sec. 13.B.(5) shall apply and Contractor shall select option A. or B. under Article IV therein and file an Affirmative Action Plan.

(2) **Request for Exemption – Fewer Than 15 Employees:** (MGO 39.02(9)(a)2.) Contractors who believe they are exempt based on number of employees shall submit a Request for Exemption on a form provided by the Department within thirty (30) days of the effective date of this Contract.

(3) **Exemption – Annual Aggregate Business:** (MGO 39.02(9)(a)c.): The Department will determine, at the time this Contract is presented for signature, if the Contractor is exempt because it will have less than \$50,000 in annual aggregate business with the CDA and/or City for the calendar year in which the contract is in effect. **CONTRACTORS WITH 15 OR MORE EMPLOYEES WILL LOSE THIS EXEMPTION AND BECOME SUBJECT TO SEC. 13.B.(5) UPON REACHING \$50,000 OR MORE ANNUAL AGGREGATE BUSINESS WITH THE CDA AND/OR CITY WITHIN THE CALENDAR YEAR, BEGINNING IN 2019.**

(4) **Release of Payment:** (MGO 39.02(9)(e)1.b.) All non-exempt contractors must have an approved Affirmative Action plan meeting the requirements of Article IV below on file with the Department within thirty (30) days of the effective date of this Contract and prior to release of payment by the CDA. Contractors that are exempt based on

number of employees agree to file a Request for Exemption with the Department within thirty (30) days of the effective date and prior to release of payment by the CDA.

ARTICLES OF AGREEMENT

ARTICLE I

The Contractor shall take affirmative action in accordance with the provisions of this Contract to ensure that applicants are employed, and that employees are treated during employment without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national origin and that the employer shall provide harassment-free work environment for the realization of the potential of each employee. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation and selection for training including apprenticeship insofar as it is within the control of the Contractor. The Contractor agrees to post in conspicuous places available to employees and applicants notices to be provided by the CDA setting out the provisions of the nondiscrimination clauses in this Contract.

ARTICLE II

The Contractor shall in all solicitations or advertisements for employees placed by or on behalf of the Contractor state that all qualified or qualifiable applicants will be employed without regard to race, religion, color, age, marital status, disability, sex, sexual orientation, gender identity or national origin.

ARTICLE III

The Contractor shall send to each labor union or representative of workers with which it has a collective bargaining Agreement or other Contract or understanding a notice to be provided by the CDA advising the labor union or workers representative of the Contractor's equal employment opportunity and affirmative action commitments. Such notices shall be posted in conspicuous places available to employees and applicants for employment.

ARTICLE IV

(This Article applies to non-public works contracts.)

The Contractor agrees that it will comply with all provisions of the Affirmative Action Ordinance of the City of Madison including the Contract compliance requirements. The Contractor warrants and certifies that, of the following two paragraphs, paragraph A or B is true (check one):

- ☐ A. It has prepared and has on file an affirmative action plan that meets the format requirements of Federal Revised Order No. 4, 41 CFR part 60-2, as established by 43 FR 51400 November 3, 1978, including appendices required by City of Madison ordinances or it has prepared and has on file a model affirmative action plan approved by the Madison Common Council.
- ☐ B. Within thirty (30) days after the effective date of this Contract, Contractor will complete an affirmative action plan that meets the format requirements of Federal Revised Order No. 4, 41 CFR Part 60-2, as established by 43 FR 51400, November 3, 1978, including appendices required by City of Madison ordinance or within thirty (30) days after the effective date of this Contract, it will complete a model affirmative action plan approved by the Madison Common Council.
- ☐ C. Contractor believes it is exempt from filing an affirmative action plan because it has fewer than fifteen (15) employees and has filed, or will file within thirty (30) days after the effective date of this Contract, a form required by the CDA to confirm exempt status based on number of employees. If the CDA determines that Contractor is not exempt, the Articles of Agreement will apply.
- ☐ D. Contractor believes it is exempt from filing an affirmative action plan because its annual aggregate business with the CDA or City for the calendar year in which the contract is in effect is less than fifty thousand dollars (\$50,000), or for another reason listed in MGO 39.02(9)(a)2. If the CDA determines that Contractor is not exempt, the Articles of Agreement will apply.

ARTICLE V

(This Article applies only to public works contracts.)

The Contractor agrees that it will comply with all provisions of the Affirmative Action Ordinance of the City of Madison, including the Contract compliance requirements. The Contractor agrees to submit the model affirmative action plan for public works Contractors in a form approved by the Director of Affirmative Action.

ARTICLE VI

The Contractor will maintain records as required by Section 39.02(9)(f) of the Madison General Ordinances and will provide the City's Department of Affirmative Action with access to such records and to persons who have relevant and necessary information, as provided in Section 39.02(9)(f). The City agrees to keep all such records confidential, except to the extent that public inspection is required by law.

ARTICLE VII

In the event of the Contractor's or subcontractor's failure to comply with the Equal Employment Opportunity and Affirmative Action provisions of this Contract or Sections 39.03 and 39.02 of the Madison General Ordinances, it is agreed that the CDA at its option may do any or all of the following:

- A. Cancel, terminate or suspend this Contract in whole or in part.
- B. Declare the Contractor ineligible for further CDA contracts until the Affirmative Action requirements are met.
- C. Recover on behalf of the CDA from the prime Contractor 0.5 percent of the Contract award price for each week that such party fails or refuses to comply, in the nature of liquidated damages, but not to exceed a total of five percent (5%) of the Contract price, or ten thousand dollars (\$10,000), whichever is less. Under public works contracts, if a subcontractor is in noncompliance, the CDA may recover liquidated damages from the prime Contractor in the manner described above. The preceding sentence shall not be construed to prohibit a prime Contractor from recovering the amount of such damage from the noncomplying subcontractor.

ARTICLE VIII

(This Article applies to public works contracts only.)

The Contractor shall include the above provisions of this Contract in every subcontract so that such provisions will be binding upon each subcontractor. The Contractor shall take such action with respect to any subcontractor as necessary to enforce such provisions, including sanctions provided for noncompliance.

ARTICLE IX

The Contractor shall allow the maximum feasible opportunity to small business enterprises to compete for any subcontracts entered into pursuant to this Contract. (In federally funded contracts the terms "DBE, MBE, and WBE" shall be substituted for the term "small business" in this Article.)

14. **SEVERABILITY.**

It is mutually agreed that in case any provision of this Contract is determined by any court of law to be unconstitutional, illegal or unenforceable, it is the intention of the parties that all other provisions of this Contract remain in full force and effect.

15. **NOTICES.**

All notices to be given under the terms of this Contract shall be in writing and signed by the person serving the notice, and shall be sent registered or certified mail, return receipt requested, postage prepaid, or hand delivered to the addresses of the parties listed below. When sending electronic mail, an active read receipt shall be attached and include a statement that the electronic mail constitutes notice under the terms of this Contract. All time periods with respect to notice shall commence on the date that electronic notice is sent.

FOR THE CDA:

City of Madison Office of Real Estate Service
Department of Planning, Community & Economic Development
c/o James Whitney, AIA, Architect
210 Martin Luther King Jr Blvd, Room 115
Madison, WI 53703
jwhitney@cityofmadison.com

FOR THE CONTRACTOR:

16. **STATUS OF CONTRACTOR/INDEPENDENT/TAX FILING.**

It is agreed that Contractor is an independent Contractor and not an employee of the CDA, and that any persons who the Contractor utilizes and provides for services under this Contract are employees of the Contractor and are not employees of the CDA.

Contractor shall provide its taxpayer identification number (or social security number) on a W-9 form filled out and sent to Jim Whitney, prior to payment. The Contractor is informed that as an independent Contractor, s/he may have a responsibility to make estimated tax returns, file tax returns, and pay income taxes and make social security payments on the amounts received under this Contract and that no amounts will be withheld from payments made to this Contractor for these purposes and that payment of taxes and making social security payments are solely the responsibility and obligation of the Contractor. The Contractor is further informed that s/he may be subject to civil and/or criminal penalties if s/he fails to properly report income and pay taxes and social security taxes on the amount received under this Contract.

17. **GOODWILL.**

Any and all goodwill arising out of this Contract inures solely to the benefit of the CDA; Contractor waives all claims to benefit of such goodwill.

18. **THIRD PARTY RIGHTS.**

This Contract is intended to be solely between the parties hereto. No part of this Contract shall be construed to add, supplement, amend, abridge or repeal existing rights, benefits or privileges of any third party or parties, including but not limited to employees of either of the parties.

19. **AUDIT AND RETAINING OF DOCUMENTS.**

The Contractor agrees to provide all reports requested by the CDA including, but not limited to, financial statements and reports, reports and accounting of services rendered, and any other reports or documents requested. Financial and service reports shall be provided according to a schedule (when applicable) to be included in this Contract. Any other reports or documents shall be provided within five (5) working days after the Contractor receives the CDA's written requests, unless the parties agree in writing on a longer period. Payroll records and any other documents relating to the performance of services under the terms of this Contract shall be retained by the Contractor for a period of three (3) years after completion of all work under this Contract, in order to be available for audit by the CDA or its designee.

20. **CHOICE OF LAW AND FORUM SELECTION.**

This Contract shall be governed by and construed, interpreted and enforced in accordance with the laws of the State of Wisconsin. The parties agree, for any claim or suit or other dispute relating to this Contract that cannot be mutually resolved, the venue shall be a court of competent jurisdiction within the State of Wisconsin and the parties agree to submit themselves to the jurisdiction of said court, to the exclusion of any other judicial district that may have jurisdiction over such a dispute according to any law.

21. **COMPLIANCE WITH APPLICABLE LAWS.**

The Contractor shall become familiar with, and shall at all times comply with and observe all federal, state, and local laws, ordinances, and regulations which in any manner affect the services or conduct of the Contractor and its agents and employees. If Contractor discovers that the prescribed work is not in accordance with codes, Contractor will promptly notify CDA and await direction from CDA.

22. **CONFLICT OF INTEREST.**

- A. The Contractor warrants that it and its agents and employees have no public or private interest, and will not acquire directly or indirectly any such interest, which would conflict in any manner with the performance of the services under this Agreement.
- B. The Contractor shall not employ or Contract with any person currently employed by the CDA for any services included under the provisions of this Agreement.

23. **COMPENSATION/ CONTRACT AMOUNT**

It is expressly understood and agreed that in no event will the total compensation for the Scope of Services under this Contract shall exceed ----- (\$ _____) or the "Contract Price". This Contract Price includes but is not limited to the following costs to perform the Scope of Services: all labor; profit; permit fees (excluding building permits); parts; materials; tools; supplies; equipment; crane rental; demolition; mechanical, electrical and plumbing services; trash bin and disposal costs; rest room supplies; cleaning services; insurance costs; bonds; contingency, and other facilities necessary or proper for, or incidental to, all Scope of Services work for the Project as required by, and in accordance with this Contract.

24. **BASIS FOR PAYMENT.**

- A. **GENERAL**
 - (1) The CDA will pay the Contractor for the completed and accepted services rendered under this Contract on the basis and at the Contract Price set forth in Section 23 of this Contract. The CDA will pay the Contractor for completed and approved "extra services", if any, if such "extra services" are authorized in writing according to the procedure established in this section. The rate of payment for "extra services" shall be the rate established in this Contract. Such payment shall be full compensation for services rendered and for all labor, material, supplies, equipment and incidentals necessary to complete the services.
 - (2) The Contractor shall submit monthly invoices to the CDA as work is completed, on the AIA® contractor form G702 Application and Certificate for Payment along with a partial lien waiver. The final invoice shall be submitted to the CDA within three months of completion of services under this Agreement.
 - (3) Should this Agreement contain more than one service, a separate invoice and a separate final statement shall be submitted for each individual service.
 - (4) Payment shall not be construed as CDA acceptance of unsatisfactory or defective services or improper materials.
 - (5) Final payment of any balance due the Contractor will be made upon acceptance by the CDA of the services under the Agreement and upon receipt by the CDA of documents required to be returned or to be furnished by the Contractor under this Agreement.
 - (6) The CDA has the equitable right to set off against any sum due and payable to the Contractor under this Agreement, any amount the CDA determines the Contractor owes the CDA, whether arising under this Agreement or under any other Agreement or otherwise.
 - (7) Compensation in excess of the total Contract Price will not be allowed unless authorized by an amendment under Section 9, AMENDMENT.
 - (8) The CDA will not compensate for unsatisfactory performance by the Contractor.
- B. **SERVICE ORDERS, EXTRA SERVICE, OR DECREASED SERVICE.**
 - (1) Written orders regarding the services, including extra services or decreased services, will be given by the CDA, using the procedure set forth in Section 15, NOTICES.
 - (2) The CDA may, by written order, request extra services or decreased services, as defined in Section 10 of this Contract. Unless the Contractor believes the extra services entitle it to extra compensation or additional time, the Contractor shall proceed to furnish the necessary labor, materials, and professional services to complete the services within the time limits specified in the Scope of Services, Section 3 of this Agreement, including any amendments under Section 9 of this Agreement.
 - (3) If in the Contractor's opinion the order for extra service would entitle it to extra compensation or extra time, or both, the Contractor shall not proceed to carry out the extra service, but shall notify the CDA, pursuant to Section 15 of this Agreement. The notification shall include the justification for the claim for extra compensation or extra time, or both, and the amount of additional fee or time requested.
 - (4) The CDA shall review the Contractor's submittal and respond in writing, either authorizing the Contractor to perform the extra service, or refusing to authorize it. The Contractor shall not receive additional compensation or time unless the extra compensation is authorized by the CDA in writing.

25. **DEFAULT/TERMINATION.**

- A. In the event Contractor shall default in any of the covenants, agreements, commitments, or conditions herein contained, and any such default shall continue unremedied for a period of ten (10) days after written notice thereof to Contractor, the CDA may, at its option and in addition to all other rights and remedies which it may have at law or in equity against Contractor, including expressly the specific enforcement hereof, forthwith have the cumulative right to immediately terminate this Contract and all rights of Contractor under this Contract.
- B. Notwithstanding paragraph A., above, the CDA may in its sole discretion and without any reason terminate this Agreement at any time by furnishing the Contractor with ten (10) days' written notice of termination. In the event of termination under this subsection, the CDA will pay for all work completed by the Contractor and accepted by the CDA.

26. **INDEMNIFICATION.**

To the fullest extent permitted by law, the Contractor shall indemnify, defend and hold harmless the CDA, City of Madison, and their officials, officers, agents, employees, and consultants from and against all suits, claims, damages, losses and expenses, direct, indirect or consequential (including but not limited to fees and charges of engineers, architects, attorneys and other professionals and court and arbitration costs) arising out of or resulting from the performance of the work, provided that any such claim, damage, loss or expense: (a) is attributable to bodily injury, sickness, disease, death, personal injury, or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom and, (b) is caused in whole or in part by any act or omission of the Contractor, any subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the work or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder or arises by or is imposed by law regardless of the negligence of any such party.

In any and all claims against the CDA, City of Madison, its officials, officers, agents, employees, or consultants, by any employee of the Contractor, any subcontractor, any person or organization directly or indirectly employed by any of them to perform or furnish any of the work or anyone for whose acts any of them may be liable, the indemnification obligation hereunder shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any such subcontractor or other person or organization under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.

The obligations of the Contractor hereunder shall not extend to the liability of the CDA's consultants or consultants' agents or employees arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, and designs or specifications. The provisions of this Section shall survive termination of this Contract.

27. **INSURANCE.**

It shall be the Contractor's responsibility to see that all of the Contract operations incident to the completion of the Contract are covered by liability insurance in order that the general public or any representative of the contracting authority may have recourse against a responsible party for injuries or damages sustained as a result of said Contract operations. This requirement shall apply with equal force, whether the work is performed by the Contractor, or by a subcontractor or by anyone directly or indirectly employed by either of them. The Contractor shall not commence work under this Contract, nor shall the Contractor allow any Subcontractor to commence work on its Subcontract, until the insurance required below has been obtained and corresponding certificate(s) of insurance have been approved by the City Risk Manager.

Commercial General Liability

The Contractor shall procure and maintain during the life of this Contract, Commercial General Liability insurance including, but not limited to, bodily injury, property damage, products liability, completed operations, contractual liability, and explosion, collapse and underground coverage in an amount not less than \$1,000,000 per occurrence/\$2,000,000 aggregate on a per project basis. Products-completed operations coverage shall be carried for two years after completion of work. Contractor's coverage shall be primary and non-contributory, and list the CDA, City of Madison, and their officers, officials, agents and employees as Additional Insureds.

Automobile Liability

The Contractor shall procure and shall maintain during the life of this Contract Business Automobile Liability insurance covering owned, non-owned and hired automobiles for limits of not less than \$1,000,000 combined single limit per accident.

Worker's Compensation

The Contractor shall procure and maintain during the life of this Contract, statutory Workers' Compensation Insurance as required by the State of Wisconsin and other applicable laws on employees to be engaged in work at the site of the Project and/or the at South Transfer site under this Contract and, in case of any such work sublet, the Contractor shall require the subcontractor(s) similarly to provide Workers' Compensation Insurance for all of the latter's employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's Workers' Compensation Insurance. The Contractor and subcontractor(s) shall also carry minimum Employers Liability limits of \$100,000 Each Accident, \$100,000 Disease – Each Employee, and \$500,000 Disease – Policy Limit, or those limits necessary to meet underlying Umbrella Liability insurance requirements.

Umbrella Liability

The Contractor shall procure and maintain during the life of this Contract Umbrella Liability coverage at least as broad as the underlying Commercial General Liability, Business Automobile Liability and Employers Liability with minimum limits of \$5,000,000 per occurrence and aggregate.

Builders Risk

The Contractor shall purchase and maintain, property insurance written on a builder's risk "all-risk" policy form in the amount of the initial Contract Price, plus the value of subsequent Contract modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis less the cost of sitework and demolition. Such insurance shall be maintained until the date in time that the CDA takes occupancy or possession of the Parking Structure, unless otherwise agreed to in writing by Contractor and CDA. This insurance shall include interests of the CDA, the Contractor and subcontractors. This insurance does not include Contractor's or subcontractor's property which is not intended to be incorporated into the work such as tools, sheds, hoists, canvasses, tarpaulins, mixers, scaffolding, staging towers owned or rented, or similar property not expended in the completion of, or to become a permanent part of the installation of the work.

Such insurance shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and soft costs, including but not limited to additional interest costs, insurance, architect fees, engineering fees, contractor fees, legal and accounting fees, city staff costs, bond and permit fees, rental/lease costs and other administrative costs required as a result of such insured loss.

If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles.

This insurance shall cover portions of the work stored off-site and the South Transfer site, and also portions of the work in transit. The Contractor shall carry sufficient all risk insurance on both the owned and leased equipment at the site of work and enroute to and from the site of work to fully protect Contractor. The Contractor shall require the same coverage of subcontractors. It is expressly understood and agreed that the CDA and City shall bear no responsibility for any loss or damage to such equipment.

Partial occupancy or use shall not commence until the insurance company or companies providing insurance have consented to such partial occupancy or use by endorsement or otherwise. The CDA and Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

Subcontractor's Insurance

The Contractor shall insure the activities of their Subcontractors in their own policy.

Acceptability of Insurers. The above-required insurance is to be placed with insurers who have an A.M. Best rating of no less than A- (A minus) and a Financial Category rating of no less than VII.

Proof of Insurance, Approval. The Contractor shall provide the CDA with certificate(s) of insurance showing the type, amount, effective dates, and expiration dates of required policies prior to commencing work under this Contract. Contractor shall provide the certificate(s) to the City's representative upon execution of the Contract, or sooner, for approval by the City Risk Manager. If any of the policies required above expire while this Contract is still in effect, Contractor shall provide renewal certificate(s) to the City for approval. Certificate Holder language should be listed as follows:

City of Madison
ATTN: Risk Management, Room 406
210 Martin Luther King, Jr. Blvd.
Madison, WI 53703

The Contractor shall provide copies of additional insured endorsements or insurance policies, if requested by the City Risk Manager. The Contractor and/or Insurer shall give the CDA thirty (30) days advance written notice of cancellation, non-renewal or material changes to any of the above-required policies during the term of this Contract.

28. **OWNERSHIP OF CONTRACT PRODUCT.**

All work product including, but not limited to, original drawings and specifications, renderings, models, scale details, approved copies of shop drawings, record drawings, document, materials, files, reports, , including magnetic tapes, disks of computer-aided designs or other electronically stored data or information and other such documents (the "Documents"), which the Contractor prepares pursuant to the terms and conditions this Contract are the sole property of the CDA. The Contractor will not publish any such materials or use them for any research or publication, other than as expressly required or permitted by this Contract, without the prior written permission of the CDA. The grant or denial of such permission shall be at the CDA's sole discretion.

The Contractor intends that the copyright to the Documents shall be owned by CDA, whether as author (as a Work Made For Hire), or by assignment from Contractor to CDA. The parties expressly agree that the Documents shall be considered a Work Made For Hire as defined by Title 17, United States Code, Section 101(2).

As further consideration for the CDA entering into this Contract, the Contractor hereby assigns to the CDA all of the Contractor's rights, title, interest and ownership in the Documents, including the right to procure the copyright therein and the right to secure any renewals, reissues and extensions of any such copyright in any foreign country. The CDA shall be entitled to the sole and exclusive benefit of the Documents, including the copyright thereto, and whenever required by the City, the Contractor shall at no additional compensation, execute all documents of assignment of the full and exclusive benefit and copyright thereof to the CDA. Any subcontractors and other independent Contractors who prepare portions of the Documents shall be required by the Contractor to execute an assignment of ownership in favor of the CDA before commencing work.

Documents prepared under this Contract may be distributed by the CDA for informational purposes without additional compensation to the Contractor.

Specifications and isolated, detail drawings inherent to the Contractor's design of the Project, whether provided by the CDA or generated by the Contractor, shall be available for future use by the parties to this Contract and other parties, each at their own risk.

If design and documentation has been completed using automated or computerized techniques, the Contractor shall provide a copy of project documents upon request in a format approved by the CDA.

29. **BAN THE BOX – ARREST AND CRIMINAL BACKGROUND CHECKS.** By policy, the CDA has opted to require contractors to comply with the requirements of the City of Madison General Ordinance Sec. 39.08. This Section applies to contracts exceeding \$25,000, except for contracts with property management companies.

A. **DEFINITIONS.**

For purposes of this section, "Arrest and Conviction Record" includes, but is not limited to, information indicating that a person has been questioned, apprehended, taken into custody or detention, held for investigation, arrested, charged with, indicted or tried for any felony, misdemeanor or other offense pursuant to any law enforcement or military authority.

"Conviction record" includes, but is not limited to, information indicating that a person has been convicted of a felony, misdemeanor or other offense, placed on probation, fined, imprisoned or paroled pursuant to any law enforcement or military authority.

"Background Check" means the process of checking an applicant's arrest and conviction record, through any means.

B. **REQUIREMENTS.** For the duration of this Contract, the Contractor shall:

- (1) Remove from all job application forms any questions, check boxes, or other inquiries regarding an applicant's arrest and conviction record, as defined herein.
- (2) Refrain from asking an applicant in any manner about their arrest or conviction record until after conditional offer of employment is made to the applicant in question.
- (3) Refrain from conducting a formal or informal background check or making any other inquiry using any privately or publicly available means of obtaining the arrest or conviction record of an applicant until after a conditional offer of employment is made to the applicant in question.
- (4) Make information about this ordinance available to applicants and existing employees, and post notices in prominent locations at the workplace with information about the ordinance and complaint procedure using language provided by the CDA.
- (5) Comply with all other provisions of Sec. 39.08, MGO.

C. **EXEMPTIONS:** This section does not apply when:

- (1) Hiring for a position where certain convictions or violations are a bar to employment in that position under applicable law, or
- (2) Hiring a position for which information about criminal or arrest record, or a background check is required by law to be performed at a time or in a manner that would otherwise be prohibited by this ordinance, including a licensed trade or profession where the licensing authority explicitly authorizes or requires the inquiry in question.

To be exempt under sec. C.(1) or (2) above, Contractor must demonstrate to the CDA that there is a law or regulation that requires the hiring practice in question. If so, the contractor is exempt from this section for the position(s) in question.

30. **WEAPONS PROHIBITION.**

Contractor shall prohibit, and shall require its subcontractors to prohibit, its employees from carrying weapons, including concealed weapons, in the course of performance of work under this Contract, other than while at the Contractor's or subcontractor's own business premises. This requirement shall apply to vehicles used at any City work site and vehicles used to perform any work under this Contract, except vehicles that are an employee's "own motor vehicle" pursuant to Wis. Stat. sec. 175.60(15m).

31. **AUTHORITY.**

Contractor represents that it has the authority to enter into this Contract. If the Contractor is not an individual, the person signing on behalf of the Contractor represents and warrants that he or she has been duly authorized to bind the Contractor and sign this Contract on the Contractor's behalf.

32. **COUNTERPARTS, ELECTRONIC SIGNATURE AND DELIVERY.**

This Contract may be signed in counterparts, each of which shall be taken together as a whole to comprise a single document. Signatures on this Contract may be exchanged between the parties by facsimile, electronic scanned copy (.pdf) or similar technology and shall be as valid as original; and this Contract may be converted into electronic format and signed or given effect with one or more electronic signature(s) if the electronic signature(s) meets all requirements of Wis. Stat. ch. 137 or other applicable Wisconsin or Federal law. Executed copies or counterparts of this Contract may be delivered by facsimile or email and upon receipt will be deemed original and binding upon the parties hereto, whether or not a hard copy is also delivered. Copies of this Contract, fully executed, shall be as valid as an original.

SIGNATURES FOLLOW ON THE NEXT PAGE

IN WITNESS WHEREOF, the parties hereto have set their hands at Madison, Wisconsin.

CONTRACTOR

(Type or Print Name of Contracting Entity)

By: _____

(Authorized Signature)

Date: _____

**COMMUNITY DEVELOPMENT AUTHORITY OF THE CITY OF
MADISON, WISCONSIN
a body corporate & public**

By: _____

Claude Gilmore, Chair CDA

By: _____

Matt Wachter, Executive Director CDA

Effective

Date: _____

B. Insurance Requirements/Certificate of Insurance

It shall be the Contractor's responsibility to see that all of the Contract operations incident to the completion of the Contract are covered by liability insurance in order that the general public or any representative of the contracting authority may have recourse against a responsible party for injuries or damages sustained as a result of said Contract operations. This requirement shall apply with equal force, whether the work is performed by the Contractor, or by a subcontractor or by anyone directly or indirectly employed by either of them. The Contractor shall not commence work under this Contract, nor shall the Contractor allow any Subcontractor to commence work on its Subcontract, until the insurance required below has been obtained and corresponding certificate(s) of insurance have been approved by the City Risk Manager.

Commercial General Liability

The Contractor shall procure and maintain during the life of this Contract, Commercial General Liability insurance including, but not limited to, bodily injury, property damage, products liability, completed operations, contractual liability, and explosion, collapse and underground coverage in an amount not less than \$1,000,000 per occurrence/\$2,000,000 aggregate on a per project basis. Products-completed operations coverage shall be carried for two years after completion of work. Contractor's coverage shall be primary and non-contributory, and list the CDA, City of Madison, and their officers, officials, agents and employees as Additional Insureds.

Automobile Liability

The Contractor shall procure and shall maintain during the life of this Contract Business Automobile Liability insurance covering owned, non-owned and hired automobiles for limits of not less than \$1,000,000 combined single limit per accident.

Worker's Compensation

The Contractor shall procure and maintain during the life of this Contract, statutory Workers' Compensation Insurance as required by the State of Wisconsin and other applicable laws on employees to be engaged in work at the site of the Project and/or the at South Transfer site under this Contract and, in case of any such work sublet, the Contractor shall require the subcontractor(s) similarly to provide Workers' Compensation Insurance for all of the latter's employees to be engaged in such work unless such employees are covered by the protection afforded by the Contractor's Workers' Compensation Insurance. The Contractor and subcontractor(s) shall also carry minimum Employers Liability limits of \$100,000 Each Accident, \$100,000 Disease – Each Employee, and \$500,000 Disease – Policy Limit, or those limits necessary to meet underlying Umbrella Liability insurance requirements.

Umbrella Liability

The Contractor shall procure and maintain during the life of this Contract Umbrella Liability coverage at least as broad as the underlying Commercial General Liability, Business Automobile Liability and Employers Liability with minimum limits of \$5,000,000 per occurrence and aggregate.

Builders Risk

The Contractor shall purchase and maintain, property insurance written on a builder's risk "all-risk" policy form in the amount of the initial Contract Price, plus the value of subsequent Contract modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis less the cost of sitework and demolition. Such insurance shall be maintained until the date in time that the CDA takes occupancy or possession of the Parking Structure, unless otherwise agreed to in writing by Contractor and CDA. This insurance shall include interests of the CDA, the Contractor and subcontractors. This insurance does not include Contractor's or subcontractor's property which is not intended to be incorporated into the work such as tools, sheds, hoists, canvasses, tarpaulins, mixers, scaffolding, staging towers owned or rented, or similar property not expended in the completion of, or to become a permanent part of the installation of the work.

Such insurance shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and soft costs, including but not limited to additional interest costs, insurance, architect fees, engineering fees, contractor fees, legal and accounting fees, city staff costs, bond and permit fees, rental/lease costs and other administrative costs required as a result of such insured loss.

If the property insurance requires deductibles, the Contractor shall pay costs not covered because of such deductibles.

This insurance shall cover portions of the work stored off-site and the South Transfer site, and also portions of the work in transit. The Contractor shall carry sufficient all risk insurance on both the owned and leased equipment at the site of work and enroute to and from the site of work to fully protect Contractor. The Contractor shall require the same coverage of subcontractors. It is expressly understood and agreed that the CDA and City shall bear no responsibility for any loss or damage to such equipment.

Partial occupancy or use shall not commence until the insurance company or companies providing insurance have consented to such partial occupancy or use by endorsement or otherwise. The CDA and Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

Subcontractor's Insurance

The Contractor shall insure the activities of their Subcontractors in their own policy.

Acceptability of Insurers. The above-required insurance is to be placed with insurers who have an A.M. Best rating of no less than A- (A minus) and a Financial Category rating of no less than VII.

Proof of Insurance, Approval. The Contractor shall provide the CDA with certificate(s) of insurance showing the type, amount, effective dates, and expiration dates of required policies prior to commencing work under this Contract. Contractor shall provide the certificate(s) to the City's representative upon execution of the Contract, or sooner, for approval by the City Risk Manager. If any of the policies required above expire while this Contract is still in effect, Contractor shall provide renewal certificate(s) to the City for approval. Certificate Holder language should be listed as follows:

City of Madison
ATTN: Risk Management, Room 406
210 Martin Luther King, Jr. Blvd.
Madison, WI 53703

The Contractor shall provide copies of additional insured endorsements or insurance policies, if requested by the City Risk Manager. The Contractor and/or Insurer shall give the CDA thirty (30) days advance written notice of cancellation, non-renewal or material changes to any of the above-required policies during the term of this Contract.

C. Payment and Performance Bond Form

SEE NEXT PAGE

PAYMENT AND PERFORMANCE BOND

KNOW ALL PARTIES BY THESE PRESENT, that we _____
as Principal, and _____
Company of _____ as surety, are held and firmly bound unto the
Community Development Authority of the City of Madison, Wisconsin, in the sum of _____
(\$ _____) Dollars, lawful money of the United States, for the payment of which sum to the
Community Development Authority of the City of Madison, we hereby bind ourselves and our respective
executors and administrators firmly by these present.

The condition of this Bond is such that if the above bounden shall on his/her part fully and faithfully perform
all of the terms of the attached Contract related to RFB number 12006-0-2023-JW entered into between
The _____ and the Community Development Authority of the City of Madison for the
general contractor will perform for the Scope of Services related to the Village on Park Parking Structure
and Site Improvements ("Structure Site Work") and the Alteration Work to Adjacent Grocery Store to New
Parking Structure ("Grocery Alteration Work") (the "Work") in Madison, Wisconsin, and shall pay all claims
for labor performed and material furnished in the prosecution of said Work, and save the Community
Development Authority of the City of Madison harmless from all claims for damages because of negligence
in the prosecution of said Work, and shall save harmless the said Community Development Authority of the
City of Madison from all claims for compensation (under Chapter 102, Wisconsin Statutes) of employees
and employees of subcontractor, then this Bond is to be void, otherwise of full force, virtue and effect.

Signed and sealed this _____ day of _____

Countersigned

Company Name (Principal)

Witness

President

Seal

Secretary

Approved as to form

Surety

Seal

Salary Employee

☐

Commission

☐

By _____

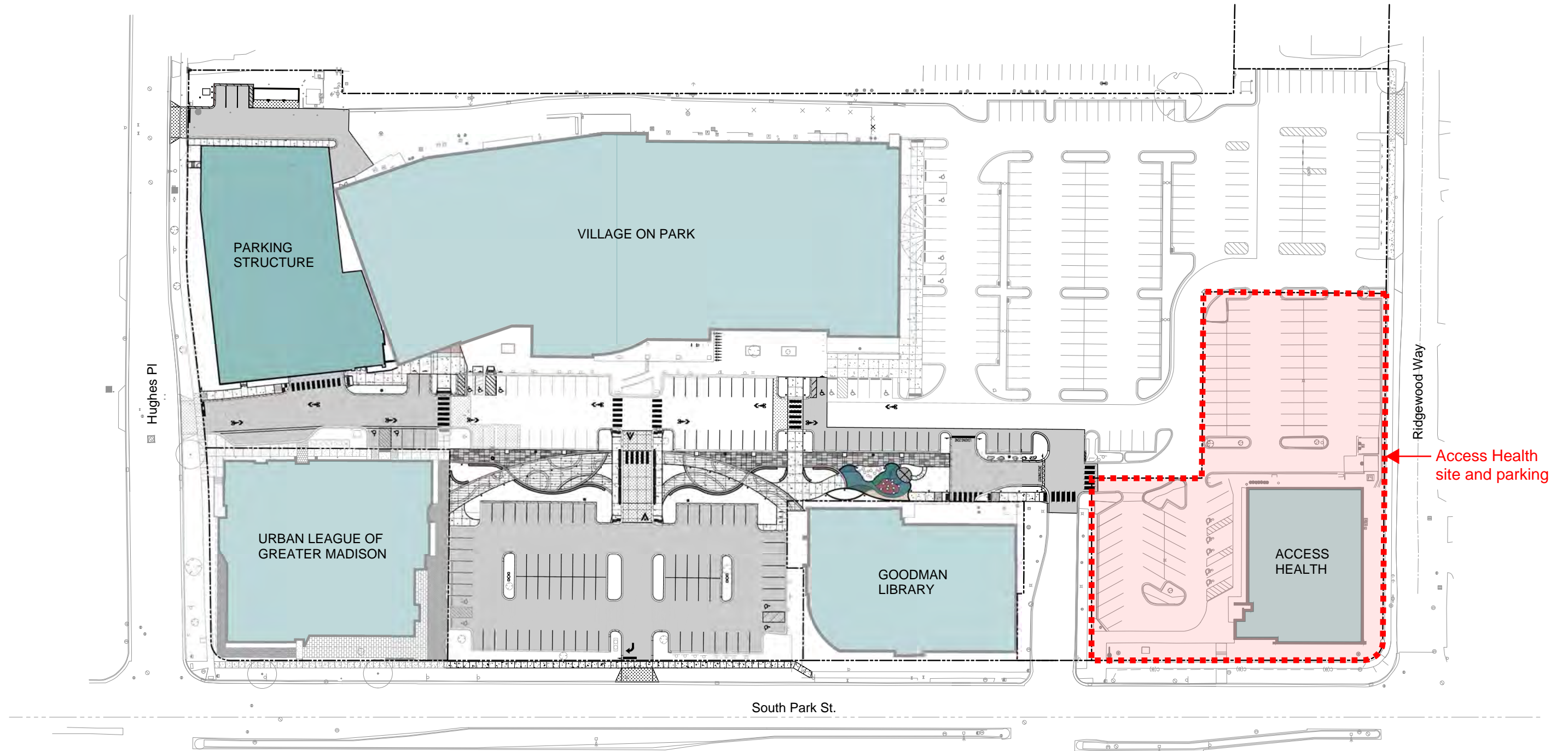
City Attorney

Attorney-in-Fact

This certifies that I have been duly licensed as an agent for the above company in Wisconsin under
License Number _____ for the year 2023, and appointed as attorney-in-fact with
authority to execute this Payment and Performance Bond, which power of attorney has not been
revoked.

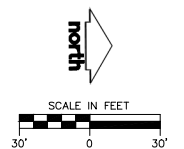
Date

Agent Signature



KEY SITE PLAN

4/7/23



Bid Documents

PROJECT MANUAL

Village on Park Parking Structure and Site Improvements

FOR

Community Development Authority
of the City of Madison
210 Martin Luther King Jr. Blvd.
Madison, WI 53703



GRAEF Project No. 2022-5013.00



July 28, 2023



ENGINEER/ARCHITECT

Graef-USA Inc.

1010 East Washington Avenue, Suite 202
Madison, WI 53703-3130
(608) 242-1550

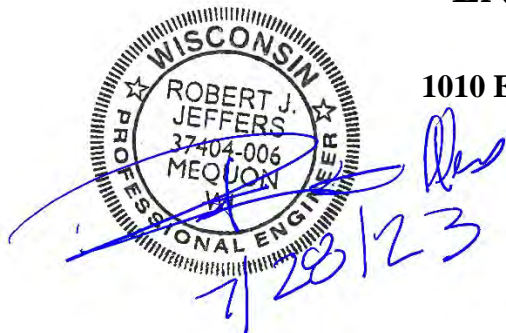


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**SECTION 011000
SUMMARY**

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Village On Park Parking Structure
- B. Owner's Name: Community Development Authority of the City of Madison.
- C. Architect's Name: GRAEF.
- D. The Project consists of the construction of a new post tensioned concrete 290 stall parking garage and site improvements with landscaping.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 005200 - Agreement Form.

1.03 DESCRIPTION OF ALTERATIONS WORK

- A. Scope of alterations work is indicated on drawings.

1.04 WORK BY OWNER

- A. Owner will supply and install the following:
- B. Owner will supply the following for installation by Contractor:

1.05 OWNER OCCUPANCY

- A. Owner intends to continue to occupy adjacent portions of the existing building and site during the entire construction period.
- B. Owner intends to occupy the Project upon Substantial Completion.
- C. Owner intends to occupy a certain portion of the Project prior to the completion date for the conduct of normal operations.
- D. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- E. Schedule the Work to accommodate Owner occupancy.

1.06 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations:
 - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Arrange use of site and premises to allow:
 - 1. Owner occupancy.
 - 2. Use of site and premises by the public.
- C. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Utility Outages and Shutdown:
 - 1. Limit disruption of utility services to hours the building is unoccupied.
 - 2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 - 3. Prevent accidental disruption of utility services to other facilities.

1.07 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Owner.
- B. Meet and confer with the Owner to prepare a site construction phasing plan. Include construction fencing locations, staging, trailer, material storage plans, and similar items. Public parking and public vehicle circulation and pedestrian access to the existing Village Mall tenants

and stores, the Urban League building, and the Goodman Library building will be required for the duration of construction.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 013000
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Contractor's daily reports.
- G. Progress photographs.
- H. Schedule of Values.
- I. Coordination drawings.
- J. Submittals for review, information, and project closeout.
- K. Number of copies of submittals.
- L. Requests for Interpretation (RFI) procedures.
- M. Submittal procedures.

1.02 RELATED REQUIREMENTS

- A. Section 016000 - Product Requirements: General product requirements.

1.03 GENERAL ADMINISTRATIVE REQUIREMENTS

- A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
 - 1. Requests for Interpretation (RFI).
 - 2. Requests for substitution.
 - 3. Shop drawings, product data, and samples.
 - 4. Test and inspection reports.
 - 5. Design data.
 - 6. Manufacturer's instructions and field reports.
 - 7. Applications for payment and change order requests.
 - 8. Progress schedules.
 - 9. Coordination drawings.
 - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
 - 11. Closeout submittals.
- C. Pay Application Procedure:
 - 1. The Contractor shall submit monthly invoices to the CDA as work is completed, on the AIA® contractor form G702 Application and Certificate for Payment along with a partial lien waiver. Refer to the Contract for Purchase of Services for more information in section 24, Basis for Payment.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.

1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 2. Contractor and Architect are required to use this service.
 3. It is Contractor's responsibility to submit documents in allowable format.
 4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the service at no extra charge.
 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Cost: The cost of the service will be paid by Owner.
- C. Submittal Service: The selected service is:
- D. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect and Contractor participating; further training is the responsibility of the user of the service.
- E. Project Closeout: Architect will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

3.02 PRECONSTRUCTION MEETING

- A. Schedule meeting after Notice of Award.
- B. Attendance Required:
1. Owner.
 2. Architect.
 3. Contractor.
- C. Agenda:
1. Execution of Owner-Contractor Agreement.
 2. Submission of executed bonds and insurance certificates.
 3. Distribution of Contract Documents.
 4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 5. Submission of initial Submittal schedule.
 6. Designation of personnel representing the parties to Contract, _____ and Architect.
 7. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
 8. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the work at maximum two week intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
1. Contractor.

2. Owner.
 3. Architect.
 4. Contractor's superintendent.
 5. Major subcontractors.
- D. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Maintenance of progress schedule.
 7. Corrective measures to regain projected schedules.
 8. Planned progress during succeeding work period.
 9. Maintenance of quality and work standards.
 10. Effect of proposed changes on progress schedule and coordination.
 11. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 CONSTRUCTION PROGRESS SCHEDULE

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

3.05 DAILY CONSTRUCTION REPORTS

- A. Include only factual information. Do not include personal remarks or opinions regarding operations and/or personnel.
- B. In addition to transmitting electronically a copy to Owner and Architect, submit two printed copies at weekly intervals.
- C. Prepare a daily construction report recording the following information concerning events at Project site and project progress:
 1. Date.
 2. High and low temperatures, and general weather conditions.
 3. List of subcontractors at Project site.
 4. Approximate count of personnel at Project site.
 5. Safety, environmental, or industrial relations incidents.
 6. Meetings and significant decisions.
 7. Stoppages, delays, shortages, and losses. Include comparison between scheduled work activities (in Contractor's most recently updated and published schedule) and actual activities. Explain differences, if any. Note days or periods when no work was in progress and explain the reasons why.
 8. Testing and/or inspections performed.
 9. Signature of Contractor's authorized representative.

3.06 PROGRESS PHOTOGRAPHS

- A. Submit photographs with each application for payment, taken not more than 3 days prior to submission of application for payment.
- B. Submit new photographs at least once a month, within 3 days after being taken.

- C. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.
- D. Photography Type: Digital; electronic files.
- E. Provide photographs of site and construction throughout progress of work produced by an experienced photographer, acceptable to Architect.
- F. In addition to periodic, recurring views, take photographs of each of the following events:
 - 1. Completion of site clearing.
 - 2. Excavations in progress.
 - 3. Foundations in progress and upon completion.
 - 4. Structural framing in progress and upon completion.
 - 5. Enclosure of building, upon completion.
 - 6. Final completion, minimum of ten (10) photos.
- G. Take photographs as evidence of existing project conditions as follows:
- H. Webcam:
 - 1. Provide site camera on roof of adjacent building to provide live view of site that is accessible via the internet for the architect and owner.
 - 2. Consult with Architect for instructions on views required.
 - 3. Provide factual presentation.
 - 4. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
- I. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
 - 1. Delivery Medium: Via email.
 - 2. File Naming: Include project identification, date and time of view, and view identification.
 - 3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.
 - 4. Hard Copy: Printed hardcopy (grayscale) of PDF file and point of view sketch.

3.07 COORDINATION DRAWINGS

3.08 REQUESTS FOR INTERPRETATION (RFI)

- A. Definition: A request seeking one of the following:
 - 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
 - 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
 - 1. Prepare a separate RFI for each specific item.
 - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
 - b. Do not forward requests which solely require internal coordination between subcontractors.
 - 2. Prepare using software provided by the Electronic Document Submittal Service.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
 - 1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.

2. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
 - a. Approval of submittals (use procedures specified elsewhere in this section).
 - b. Approval of substitutions (see Section - 016000 - Product Requirements)
 - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
 - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
 3. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
 4. Frivolous RFIs: Requests regarding information that is clearly indicated on, or reasonably inferable from, Contract Documents, with no additional input required to clarify the question. They will be returned without a response, with an explanatory notation.
 - a. The Owner reserves the right to assess the Contractor for the costs (on time-and-materials basis) incurred by the Architect, and any of its consultants, due to processing of such RFIs.
- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.

3.09 SUBMITTAL SCHEDULE

- A. Submit to Architect for review a schedule for submittals in tabular format.
1. Submit at the same time as the preliminary schedule specified in Section - 013216 - Construction Progress Schedule.
 2. Coordinate with Contractor's construction schedule and schedule of values.
 3. Format schedule to allow tracking of status of submittals throughout duration of construction.
 4. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
 5. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.
 - a. For assemblies, equipment, systems comprised of multiple components and/or requiring detailed coordination with other work, allow for additional time to make corrections or revisions to initial submittals, and time for their review.

3.10 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

3.11 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
1. Design data.
 2. Certificates.
 3. Test reports.
 4. Inspection reports.
 5. Manufacturer's instructions.

6. Manufacturer's field reports.
7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner.

3.12 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
 1. Project record documents.
 2. Operation and maintenance data.
 3. Warranties.
 4. Bonds.
 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.13 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 1. After review, produce duplicates.
 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.14 SUBMITTAL PROCEDURES

- A. General Requirements:
 1. Utilize City's Sharepoint website.
 2. Use a separate transmittal for each item.
 3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
 5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
 - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
 6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
 - a. Upload submittals in electronic form to Electronic Document Submittal Service website.
 7. Schedule submittals to expedite the Project, and coordinate submission of related items.
 - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
 - b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
 - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
 8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
 9. Provide space for Contractor and Architect review stamps.
 10. When revised for resubmission, identify all changes made since previous submission.
 11. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.

12. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
 13. Submittals not requested will be recognized, and will be returned "Not Reviewed",
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
 2. Collect required information into a single submittal.
 3. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
 2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
- D. Samples Procedures:
1. Transmit related items together as single package.
 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
 3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

3.15 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. Architect's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
 - a. "Approved", or language with same legal meaning.
 - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
 - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
 - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
 2. Not Authorizing fabrication, delivery, and installation:
- E. Architect's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
 - a. "Received" - to notify the Contractor that the submittal has been received for record only.
 2. Items for which action was taken:
 - a. "Reviewed" - no further action is required from Contractor.

END OF SECTION

SECTION 013329.12
SUSTAINABLE DESIGN REPORTING - PARKSMART

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General requirements for sustainable design reporting.
 - 1. Construct and document the project using procedures complying with the federally mandated "Guiding Principles" (GP), Third Party Certification (TPC) requirements (if applicable), UFC 1-200-02, High Performance and Sustainable Building Requirements, and other requirements identified in this specification.

1.02 REPORTING REQUIREMENTS

- A. Contractor must familiarize himself with the relevant reporting requirements and provide the necessary information and instruction to all subcontractors and installers.

1.03 RELATED REQUIREMENTS

- A. Section 013000 - Administrative Requirements.
- B. Section 016000 - Product Requirements.

1.04 DEFINITIONS

- A. Definitions in this Article are in addition to sustainable design definitions directly related to products, as listed in Section - 016000 - Product Requirements.

1.05 PRODUCT REPORTING SCOPE

- A. General: Product reporting scope for the purpose of achieving the selected sustainability certification level is limited to those items directly affecting ability to achieve targeted credits.

1.06 REFERENCE STANDARDS

- A. USGBC LEED v4.1-BD+C - LEED v4.1 for Building Design and Construction 2019.

1.07 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for additional submittal procedures requirements.
- B. Sustainable Design Documentation: The scope of required documentation is specified in this section and in applicable individual specification sections.
- C. LEED v4.1 Prerequisites and Credits - Documentation is required for the following items:

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PROCEDURES

- A. General Submittal Requirements:
 - 1. Submit sustainable design documentation required of Contractor, using procedures defined under Submittals for Information in Section 013000.
 - 2. Submit sustainable design documentation to Architect, unless otherwise indicated.
 - 3. Submit sustainable design documentation to Sustainable Design Consultant, not to Architect, unless otherwise indicated.
- B. Where an item of sustainable design documentation is specified, fill out and submit electronically the appropriate forms or use appropriate approved software.
 - 1. Fill out one line for each different brand name product and each different manufacturer of a lot of commodity products.
 - 2. Where required attachments are specified, attach the documentation.
 - 3. Mark each blank with the appropriate information; use "ATT" for items attached; if any item is not relevant use the code "NR"; if any item is not available use the code "NA".
- C. Each form must be signed by the entity capable of certifying the information.
 - 1. Certification signatures must be made by an officer of the company.

2. For products, certification must be made by the manufacturer not the supplier.
 3. For custom fabricated products, certification by the fabricator is acceptable.
- D. Submit the completed forms in accordance with the requirements of Section 013000, as information submittals.
1. Give each form a unique submittal number.

END OF SECTION

SECTION 013566.15
PROJECT SUSTAINABILITY GOAL CREDIT SUMMARY PARKSMART

PART 1 GENERAL

1.01 PROJECT INFORMATION

- A. Project Name: Village On Park Parking Structure.
- B. City: Madison.
- C. State: WI.

1.02 PROJECT GOALS

- A. This project has been designed to achieve the LEED Certified (minimum 40 points) rating as defined in USGBC LEED v4.1-BD+C for New Construction.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - CREDIT SUMMARY

3.01 LOCATION AND TRANSPORTATION (LT)

3.02 SUSTAINABLE SITES (SS)

- A. SS Prerequisite - Required - No Points - Construction Activity Pollution Prevention.

3.03 WATER EFFICIENCY (WE)

- A. WE Prerequisite - Required - No Points - Outdoor Water Use Reduction.
- B. WE Prerequisite - Required - No Points - Indoor Water Use Reduction.
- C. WE Prerequisite - Required - No Points - Building-Level Water Metering.

3.04 ENERGY & ATMOSPHERE (EA)

- A. EA Prerequisite - Required - No Points - Fundamental Commissioning and Verification.
 - 1. Requirement for commissioning performed by and under the supervision of an independent commissioning authority is included in the Contract Documents.
 - 2. Commissioning (Cx) process activities for mechanical, electrical, plumbing, and renewable energy systems and assemblies, will be conducted in accordance with ASHRAE Guideline 0 and ASHRAE Guideline 1.1 for HVAC and R Systems, as they relate to energy, water, indoor environmental quality, and durability.
 - 3. General commissioning criteria are specified in Section 019113.
 - 4. Commissioning of HVAC is specified in Section 230800.
- B. EA Prerequisite - Required - No Points - Minimum Energy Performance.
- C. EA Prerequisite - Required - No Points - Building-Level Energy Metering.
- D. EA Prerequisite - Required - No Points - Fundamental Refrigerant Management.

3.05 MATERIALS & RESOURCES

- A. MR Prerequisite - Required - No Points - Storage and Collection of Recyclables.

3.06 INDOOR ENVIRONMENTAL QUALITY

- A. EQ Prerequisite - Required - No Points - Minimum Indoor Air Quality (IAQ) Performance.
 - 1. The overall design solution is implemented on drawings and in various sections of the specifications.
- B. EQ Prerequisite - Required - No Points - Environmental Tobacco Smoke (ETS) Control.
 - 1. Project prohibits smoking inside the building.
- C. EQ Prerequisite - Required - No Points - Minimum Acoustic Performance, for Schools projects only.
 - 1. Design meets the criteria for this prerequisite.

END OF SECTION

**SECTION 014000
QUALITY REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Submittals.
- B. Quality assurance.
- C. References and standards.
- D. Testing and inspection agencies and services.
- E. Contractor's construction-related professional design services.
- F. Contractor's design-related professional design services.
- G. Control of installation.
- H. Mock-ups.
- I. Tolerances.
- J. Manufacturers' field services.
- K. Defect Assessment.

1.02 RELATED REQUIREMENTS

- A. Section 012100 - Allowances: Allowance for payment of testing services.

1.03 CONTRACTOR'S CONSTRUCTION-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Provide such engineering design services as may be necessary to plan and safely conduct certain construction operations, pertaining to, but not limited to the following:
 - 1. Temporary sheeting, shoring, or supports.
 - 2. Temporary scaffolding.
 - 3. Temporary bracing.
 - 4. Temporary falsework for support of spanning or arched structures.
 - 5. Temporary foundation underpinning.
 - 6. Temporary stairs or steps required for construction access only.
 - 7. Investigation of soil conditions to support construction equipment.

1.04 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
 - 1. Submit a Request for Interpretation to Architect if the criteria indicated are not sufficient to perform required design services.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
 - 1. Structural Calculations and Design: As described in Section 033800 - Post-Tensioned Concrete.
 - 2. Concrete Mix and Structural Design: As described in Section 034113 - Precast Concrete Hollow Core Planks.
 - 3. Design of Piers: As described in Section 316613.13 - Rammed Aggregate Piers.

1.05 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Contractor will employ services of an independent testing agency to perform certain specified testing; payment for cost of services will be derived from allowance specified in Section 012100; see Section 012100 and applicable sections for description of services included in allowance. Provide inspection of post tensioning and rebar install prior to all deck pours. Coordinate, inspect and verify post tensioning stressing.

- B. Contractor will employ and pay for services of an independent testing agency to perform other specified testing.
- C. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- D. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.
- E. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- F. Contractor Employed Agency:

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.02 MOCK-UPS

- A. Before installing portions of the Work where mock-ups are required, construct mock-ups in location and size indicated for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work. The purpose of mock-up is to demonstrate the proposed range of aesthetic effects and workmanship.
- B. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- C. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- D. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- E. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

3.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

3.04 TESTING AND INSPECTION

- A. Testing Agency Duties:

1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 2. Perform specified sampling and testing of products in accordance with specified standards.
 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
 5. Perform additional tests and inspections required by Architect.
 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 2. Agency may not approve or accept any portion of the Work.
 3. Agency may not assume any duties of Contractor.
 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

3.05 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment, and _____ as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION

**SECTION 015000
TEMPORARY FACILITIES AND CONTROLS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Dewatering
- B. Temporary utilities.
- C. Temporary telecommunications services.
- D. Temporary sanitary facilities.
- E. Temporary Controls: Barriers, enclosures, and fencing.
- F. Security requirements.
- G. Vehicular access and parking.
- H. Waste removal facilities and services.
- I. Project identification sign.
- J. Field offices.

1.02 RELATED REQUIREMENTS

- A. Section 015100 - Temporary Utilities.
- B. Section 015213 - Field Offices and Sheds.
- C. Section 015500 - Vehicular Access and Parking.

1.03 DEWATERING

- A. Provide temporary means and methods for dewatering all temporary facilities and controls.
- B. Maintain temporary facilities in operable condition.

1.04 TEMPORARY UTILITIES - SEE SECTION 015100

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- B. Use trigger-operated nozzles for water hoses, to avoid waste of water.

1.05 TELECOMMUNICATIONS SERVICES

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
 - 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
 - 2. Project web site.

1.06 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

1.07 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities and the CDA for public rights-of-way and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.08 FENCING

- A. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

1.09 SECURITY - SEE SECTION 013553

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

1.10 VEHICULAR ACCESS AND PARKING - SEE SECTION 015500

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking. Off-site parking will be required for construction personnel.

1.11 WASTE REMOVAL

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.12 PROJECT IDENTIFICATION

- A. Provide project identification sign of design and construction indicated on drawings. Review sign design with Owner prior to making.
- B. Erect on site at location indicated.
- C. No other signs are allowed without Owner permission except those required by law.

1.13 FIELD OFFICES - SEE SECTION 015213

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack, and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
 - 1. The existing Community Conference Rooms in the adjoining Village on Park Atrium building can be used for projects meetings with advance notice.
- C. Locate offices a minimum distance of 30 feet from existing and new structures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

**SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Cutting and patching.
- C. Surveying for laying out the work.
- D. Cleaning and protection.
- E. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- F. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.

1.03 QUALIFICATIONS

- A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.04 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and _____.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations, and _____.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.04 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.05 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. Perform whatever cutting and patching is necessary to:
 - 1. Complete the work.
 - 2. Fit products together to integrate with other work.
 - 3. Provide openings for penetration of mechanical, electrical, and other services.
 - 4. Match work that has been cut to adjacent work.
 - 5. Repair areas adjacent to cuts to required condition.
 - 6. Repair new work damaged by subsequent work.
 - 7. Remove samples of installed work for testing when requested.
 - 8. Remove and replace defective and non-complying work.
- C. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- D. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

- E. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- F. Restore work with new products in accordance with requirements of Contract Documents.
- G. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.
- I. Patching:
 - 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 - 2. Match color, texture, and appearance.
 - 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.06 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.07 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.08 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.09 FINAL CLEANING

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.10 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.11 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

**SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Owner may decide to pay for additional recycling, salvage, and/or reuse based on Landfill Alternatives Proposal specified below.
- E. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
 - 1. Aluminum and plastic beverage containers.
 - 2. Corrugated cardboard.
 - 3. Wood pallets.
 - 4. Clean dimensional wood.
 - 5. Land clearing debris, including brush, branches, logs, and stumps; see Section 311000 - Site Clearing for use options.
 - 6. Concrete: May be crushed and used as riprap, aggregate, sub-base material, or fill.
 - 7. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
- F. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- G. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- H. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
- I. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 RELATED REQUIREMENTS

- A. Section 016000 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- B. Section 311000 - Site Clearing: Handling and disposal of land clearing debris.

1.03 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.04 SUBMITTALS

- A. Sustainable Design Submittals: Submit Waste Management Plan and Waste Disposal Reports in accordance with procedures specified in Section 013566.13 - Sustainability Certification Project Procedures - Green Globes.
- B. Landfill Alternatives Proposal: Within 10 calendar days after receipt of Notice of Award of Bid, or prior to any trash or waste removal, whichever occurs sooner, submit a projection of trash/waste that will require disposal and alternatives to landfilling, with net costs.
 - 1. Submit to Architect for Owner's review and approval.
 - 2. If Owner wishes to implement any cost alternatives, the Contract Price will be adjusted as specified elsewhere.
 - 3. Include an analysis of trash/waste to be generated and landfill options as specified for Waste Management Plan described below.
 - 4. Describe as many alternatives to landfilling as possible:
 - a. List each material proposed to be salvaged, reused, or recycled.
 - b. List the proposed local market for each material.
 - c. State the estimated net cost resulting from each alternative, after subtracting revenue from sale of recycled or salvaged materials and landfill tipping fees saved due to diversion of materials from the landfill.
 - 5. Provide alternatives to landfilling for at least the following materials:
 - a. Concrete.
 - b. Bricks.
 - c. Concrete masonry units.
 - d. Asphalt paving.
- C. Once Owner has determined which of the landfill alternatives addressed in the Proposal above are acceptable, prepare and submit Waste Management Plan; submit within 10 calendar days after notification by Architect.
- D. Waste Management Plan: Include the following information:
 - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.

2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 013000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 015000 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 016000 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 017000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

2.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 1. Prebid meeting.
 2. Preconstruction meeting.
 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 1. Provide containers as required.
 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

**SECTION 02 20 00
GENERAL SITEWORK REQUIREMENTS**

PART 1 GENERAL

1.01 SCOPE

- A. The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to provide the work on the site as provided for in the technical specifications and on the Drawings.
- B. All work on public facilities or on public lands and/or public rights-of-way shall conform to the applicable City of Madison Construction Standards stated below.
- C. All work shall be in accordance with applicable manufacturer's instructions.

1.02 RELATED WORK AND PROVISIONS

- A. This section relates to all Division 2 sections as they pertain to "sitework" to be performed.
- B. This specification shall apply to all site work unless otherwise specified.
- C. Applicable provisions of Division 1 shall govern all work under Division 2 and all Division 2 specifications.

1.03 REFERENCE STANDARDS

- A. Abbreviations of standards or organizations referenced in this specification are as follows:

AASHTO	American Association of State Highway and Transportation Officials
ABMA	American Boiler Manufacturers Association
ACPA	American Concrete Pipe Association
AGA	American Gas Association
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASME	American Society of Mechanical Engineers
ASPE	American society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
CISPI	Cast Iron Soil Pipe Institute
CS	Commercial Standards, Products Standards Sections, Office of Eng. Standards Service, NBS
EPA	Environmental Protection Agency
FS	Federal Specifications, Superintendent of Documents, U.S. Government Printing Office
IAPMO	International Association of Plumbing & Mechanical Officials
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
MSS	Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
PDI	Plumbing and Drainage Institute
STI	Steel Tank Institute
UL	Underwriters Laboratories Inc.
- B. Where reference is made to the "Construction Standards", it shall be construed to mean the pertinent section of the City of Madison's Construction Standards.

1.04 SUBSTITUTIONS

- A. Substitution of Materials: Refer to the General Conditions of the Contract.
- B. Where equipment, accessories, or materials are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated in the contract documents, the Contractor is responsible for all costs involved in integrating the equipment or accessories into the system and for obtaining the intended performance from the system into which these items are placed.

1.05 CONTINUITY OF EXISTING TRAFFIC, PARKING, AND UTILITIES

- A. Refer also to Division 1 - Contract General Requirements.
- B. Do not interrupt or change existing traffic, delivery, parking, or utility services without prior written approval from the Construction Representative. When interruption is required, coordinate schedule with the Owner to minimize disruptions. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.
- C. Verify the locations of any water, drainage, gas, sewer, electric, drainage, gas, sewer, electric, telephone, fuel, steam lines or other utilities, and site features which may be encountered in any excavations or other sitework. All lines shall be properly underpinned and supported to avoid disruption of service. Any service connections encountered which are to be removed shall be cut off at the limits of the excavation and capped in accordance with the requirements of permits governing such removals. Any permits required for this work will be obtained by the Owner upon request of the Contractor.
- D. The Contractor shall comply with Wisconsin Statutes 62.15(11) Street Obstructions specifically that doing any work which shall in any manner obstruct the streets or sidewalks shall put up and maintain barriers conforming to the standards for traffic control devices in the manual adopted by the Department of Transportation under s. 84.02 (4) (e) to prevent accidents, and be liable for all damages caused by failure so to do. All contracts shall contain a provision covering this liability, and also a provision making the contractor liable for all damages caused by the negligent digging up of streets, alleys or public grounds, or which may result from the Contractor's carelessness in the prosecution of such work.

1.06 PROTECTION OF EXISTING WORK AND FACILITIES

- A. Verify the locations of, and protect, any signs, paved surfaces, buildings, structures, landscaping, streetlights, utilities, and all other such facilities that may be encountered or interfered with during the progress of the work. Take all measures necessary to safeguard all existing work and facilities which are outside the limits of the work or items which are within the construction limits but are intended to remain.
- B. Protect all paved, turfed, and landscaped surfaces to remain. Protect all areas outside of the construction limits from the effects of erosion in accordance with the Erosion Control specification section.

1.07 CONSTRUCTION LIMITS

- A. Construction Limits are indicated on the Drawings. In the absence of such a designation on the Drawings, confine work to the minimum area reasonably necessary to undertake the work as determined by the Engineer. All areas disturbed by excavation and grading, plus such additional areas as are disturbed by construction related activities including construction access and storage and installation of materials shall be considered the "Construction Area".

1.08 EQUIPMENT AND MATERIALS FURNISHED BY OTHERS

- A. None.

1.09 SUBMITTALS

- A. Refer also to Division 1 - Contract General Requirements.
- B. Submit manufacturer's preproduction (shop) drawings for any off-site constructed sitework items for approval prior to the start of manufacturing and any electrically powered equipment.

1.10 CERTIFICATIONS AND INSPECTIONS

- A. Refer also to Division 1 - Contract General Conditions.
- B. Obtain and pay for all required sampling, testing, inspections, and certifications except those provided by the Architect/Engineer (A/E). Deliver originals of certificates and documents to the Owner's Project Representative. Include copies of the certifications and documents in the Operating and Maintenance instructions.

1.11 OPERATING AND MAINTENANCE INSTRUCTIONS

- A. Refer also to Division 1 - Contract General Requirements.
- B. Assemble material in an operating and maintenance manual composed of three-ring or post binders, using and index at the front of each volume and tabs for each system or type of equipment installed. In addition to the data indicated in the General Requirements, include the following information:
 - 1. Copies of all approved shop drawings.
 - 2. Manufacturer's wiring diagrams for electrically powered equipment.
 - 3. Records of tests performed to certify compliance with system requirements.
 - 4. Certificates of inspection by regulatory agencies.
 - 5. Parts lists for manufactured equipment.
 - 6. Lubrication instructions, including lists of frequency of lubrication during construction.
 - 7. Warranties and/or guarantees.
 - 8. Additional information as indicated in the technical specification sections.

1.12 TRAINING OF OWNER PERSONNEL

- A. Instruct Owner personnel or their designee in the proper operation and maintenance of systems and equipment provided as part of this project.

1.13 RECORD DRAWINGS

- A. Refer also to Division 1 - Contract General Requirements.
- B. Include copies of Record Drawings with the Operating and Maintenance instructions.

PART 2 PRODUCTS

2.01 TRAFFIC CONTROL - BARRICADES, SIGNS, AND WARNING DEVICES

- A. Provide traffic barricades, traffic signs, and warning devices in accordance with governing codes and regulations and the Manual of Uniform Traffic Control Devices (MUTCD).
- B. Provide excavation barrier fencing in plastic, blaze orange color together with all supports and braces necessary to provide an adequate safety barrier to unattended excavations.

2.02 WARNING SIGNS

- A. Provide all necessary warning signing as required by OSHA, these specifications, as directed by the Owner's Construction Representative and as shown on the Drawings. Payment for providing, placing, maintaining, and removing traffic control devices will be paid under the traffic control bid item as a lump sum item for all project areas.

PART 3 EXECUTION

3.01 PROJECT SITE CONDITIONS

- A. Maintain a clean, safe, and orderly site.
- B. Provide adequate barricades, guards, warning lights, and other protection required at excavation and hazards created by work.
- C. Control access to the site by only authorized personnel and vehicles.
- D. Maintain site housekeeping to provide for a safe and orderly project site. Collect and dispose of debris as it accumulates.
- E. Provide shoring, bracing, sheet piling, planking, and forming required by the work.

- F. Locate and protect overhead and underground utilities, sidewalks, drains, curbs, trees (including roots) shrubs, ground cover, bench marks, monuments, other reference points, adjacent buildings, materials, and property owned by others that are to remain.
- G. Protect items, bearing responsibility for and replacement cost of damage arising from all operations connected with the work. If items are disturbed or destroyed, replace as directed by the Owner's Representative.
- H. Fence and/or box in all trees and plant material which are to remain at the drip line before work is started. Do not permit heavy equipment or stockpiles within branch spread. Remove interfering branches without injury to trunks and cover scars with tree paint.
- I. Control grading around structures; pitch ground to prevent water running into excavated areas.
- J. Pits, trenches within building lines, and other excavations shall be maintained free of water.
- K. Provide trenching, pumping, and other facilities required.
- L. Notify the City of Madison and Owner's Project Representatives if springs or running water are encountered in excavation; provide discharge by trenches and drains pumping to point outside of excavation. Provide information to Owner's Project Representative of points and areas that water will be discharged. Control discharge with methods acceptable to Wisconsin Department of Natural Resources (WDNR), the Owner's Project Representative and local municipal regulations. At the Engineer's option, the Contractor shall drain the spring to the storm sewer system by the use of field tile.
- M. Be responsible for control measures to prevent damage from flooding, erosion, and sedimentation to on-site and off-site areas.
- N. Install and maintain temporary desilting basins, terraces, contour furrows, channel linings, waterways, and other measures as shown on plan and as described in the WPDES and City of Madison permits obtained for the project to prevent damage.

3.02 WATER (DUST CONTROL)

- A. Contractor shall apply water to the subgrade as directed by the Owner's Construction Representative for dust control. Water shall be provided by the contractor and placed in accordance with Section 624 of the State Specifications. Water for base compaction shall be incidental to the base aggregate items and will not be paid under this item.

3.03 SITE RESTORATION

- A. Unless otherwise specified or noted on the Drawings, fully and completely restore the site to a condition present prior to the work. Restore the surface of all disturbed areas to a like condition of the surface prior to the work. Sawcut and remove all damaged pavements to the nearest existing joints, or with prior permission, to straight and neat lines and repair with like materials to the full depth of the pavement as existed prior to the work.
- B. See applicable sections for specific restoration requirements.

3.04 CLEAN UP

- A. Level off/shape all waste disposal areas and clean up areas used for the storage of materials or the temporary deposit of excavated earth. Remove all surplus material, tools and equipment.
- B. Burning is not permitted.
- C. Thoroughly clean all sewers and structures and remove and dispose of all debris and mud.

END OF SECTION

**SECTION 02 32 00
GEOTECHNICAL INVESTIGATION**

PART 1 GENERAL

1.01 SCOPE

- A. The work under this section shall consist of providing all work, materials, labor, section provides information resulting from subsurface investigations completed at the site as part of this project. This section may contain information applicable to ALL sitework, and other technical specification sections, as well. All contractors are expected to review this information as part of their duties to familiarize themselves with the site.
- B. Results of the geotechnical investigation apply only to the locations at which data was collected, at the specific time it was collected. Geotechnical conditions may differ elsewhere on the site.
- C. Preliminary Geotechnical Exploration Report on the proposed site at 2306 South Park Street prepared for Dan Johns, Community Development Authority, c/o City of Madison Office of Real Estate Services, 215 Martin Luther King Jr Boulevard, Suite 300, Madison, WI 53703 (dated May 28, 2021).
- D. Prior to making additional investigations of his own using test pits, borings, or other methods; Bidder shall first gain permission from property owner and Owner's Project Manager.
- E. Geotechnical investigations completed by Bidder shall comply with all applicable requirements of Division 1 through Division 16 of this project.

1.02 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section.
 - 1. Section 31 05 00 - Common Work Results for Earthwork
 - 2. Section 31 20 00 - Earthmoving
 - 3. Section 31 22 16.15 - Subgrade Preparation
 - 4. Section 32 11 23 - Aggregate Base Course

PART 2 PRODUCTS

2.01 REPORTS

- A. The Geotechnical Investigation Report at the end of this section is included for the Contractor's information.
- B. This report is also available by contacting the Geotechnical Consultant:
 - 1. Construction Geotechnical Consulting Engineering/Testing (CGC, Inc.), 608-288-4100, CGC Report No. C21192.

PART 3 EXECUTION

Not used.

END OF SECTION

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Construction • Geotechnical
Consulting Engineering/Testing

May 28, 2021
C21192

Community Development Authority
c/o Mr. Dan Johns
City of Madison Office of Real Estate Service
215 Martin Luther King Jr Boulevard, Suite 300
Madison, WI 53703

Re: Preliminary Geotechnical Exploration Report
Village on Park Redevelopment
2306 South Park Street
Madison, Wisconsin

Dear Mr. Dan Johns:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the preliminary subsurface exploration program for the above-referenced project. The purpose of this program was to obtain a general overview of the subsurface conditions on the site and to provide preliminary geotechnical recommendations regarding site preparation, foundation, floor slab, below-grade wall and pavement design/construction. A determination of the site class for seismic design is also included. We are sending you and Mr. Jim Whitney with the City of Madison electronic copies of this report, and we can provide paper copies upon request.

PROJECT AND SITE DESCRIPTION

We understand that redevelopment is planned on portions of the Village on Park property, located at 2300 S. Park Street in Madison. Based on a preliminary copy of the Master Plan provided, we understand that the redevelopment will be completed in three phases. Phase 1 will include demolition of the northern end of the Villager Mall building, followed by construction of an at-grade asphalt parking lot. Phase 2 will be completed on the south side of the site along Hughes Place and will include the construction of a parking ramp and Urban League building. Phase 3 will include the construction of an Affordable Housing building in the northwest corner of the site. The proposed redevelopment layout is shown on a Boring Location Exhibit presented in Appendix B.

Based on the limited information available at the time of this report, we understand that the parking structure will be up to four stories above grade and involve cast-in-place or pre-cast concrete construction bearing on cast-in-place concrete footings. The Urban League building will be three stories above grade and may involve wood or structural steel framing bearing on cast-in-place concrete footings and foundation walls. We understand that consideration is also being given to including one level of below-grade parking at the parking ramp and Urban League buildings. The Affordable Housing building in the northwest corner of the site may include up to four stories above grade, with one level of below grade parking. We expect this building to be wood-framed construction bearing on cast-in-place concrete footings and foundation walls.

Mr. Dan Johns
City of Madison Office of Real Estate Services
May 28, 2021
Page 2

Although we anticipate that finished first floor elevations will be established near existing site grades, specific information pertaining to building and site elevations and structural loads were not available at the time of this report. However, we expect heavy foundation loads for the parking structure and moderate foundation loads for the Urban League and Affordable Housing buildings.

Existing site grades generally slope up gradually from south to north, with about 10 ft of relief noted (approximately EL 880 to 890 ft according to DCiMap 1-ft contour lines). The majority of the redevelopment areas are covered with asphalt paved parking lot areas, except for Phase 1, which is occupied by a portion of the single-story building which occupies the western approximately half of the site.

Based on a cursory review of historical aerial photos and information provided by the City, a portion of the Villager Mall building previously occupied the parking ramp development area and a former gas/service station occupied at least a portion of the Urban League building area. While unclear, it also appears that a former structure of some kind occupied at least a portion of the Affordable Housing area.

SUBSURFACE CONDITIONS

Subsurface conditions for this preliminary study were explored by drilling four (4) Standard Penetration Test (SPT) soil borings at locations selected by the client and field-staked by CGC. Borings 1 and 2, located in the vicinity of the proposed parking structure, were planned to be drilled to depths of 40 ft, but practical auger refusal occurred at about 27 and 25 ft below current site grades on possible to probable sandstone bedrock. Borings 3 and 4 were planned to a depth of 30 ft in the vicinity of the Urban League and Affordable Housing buildings, but auger refusal occurred at about 25 and 18 ft, respectively, on possible to probable sandstone bedrock.

The soil borings were conducted by Badger State Drilling (under subcontract to CGC) on April 29, 2021 using a truck-mounted CME-55 rotary drill rig equipped with hollow stem augers and an automatic SPT hammer. The specific procedures used for drilling and sampling are described in Appendix A and the boring locations are shown in plan on the Soil Boring Location Exhibit presented in Appendix B. Ground surface elevations at the boring locations were estimated by CGC based on DCiMap contour lines, and the elevations should therefore be considered approximate.

The subsurface profiles at the boring locations were fairly consistent, and the following strata were typically encountered (in descending order):

- About 11 to 17 in. of **pavement layers**, including 3 to 5 in. of *asphalt* over 8 to 12 in. of *base course*; underlain by
- 2 to 4.5 ft of **fill**, generally comprised of granular (sand) soils (not present at Boring 1); followed by

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- About 2 to 5 ft of medium stiff to stiff **lean clay** (absent at Boring 4); over
- Loose to very dense **sand** and **silt** soils, containing varying amounts of silt and gravel. The sand and/or silt soils typically increased in relative density with depth and were classified as *possible to probable highly weathered to weathered sandstone bedrock* at Borings 1 and 3. These soils extended to depths of 18 and 27 ft below existing site grades, where auger refusal occurred on possible to probable sandstone bedrock, or cobbles/boulders.

The conditions encountered in Borings 1 through 4 were generally consistent with findings in borings previously performed by CGC for the Urban League/Library Building located in the east central part of the site. However, based on the presence of buildings which formerly occupied portions of this site, including in the planned redevelopment areas, variability in soil conditions should be expected, particularly within 5 to 10 ft of the current ground/pavement surface.

Groundwater was not encountered in the soil borings during or upon the completion of drilling. Groundwater levels are generally expected to fluctuate with seasonal variations in precipitation, infiltration, evapotranspiration, the level in nearby waterbodies and other factors. A more detailed description of the site soil and groundwater conditions is presented on the Soil Boring Logs attached in Appendix B.

DISCUSSION AND RECOMMENDATIONS

Subject to the limitations discussed below and based on the subsurface exploration, it is our opinion that the site is generally suitable for the proposed construction, and that new buildings can be supported by conventional spread footing foundation systems. *However, based on the presence of existing surficial fills, as well as loose sand and softer clay soils at several borings, selective undercutting of lower-strength to marginal soils may be required below the bottom of some footings, especially if no lower level will be constructed at the parking ramp and Urban League buildings. Based on the anticipated heavy foundation loads, and in order to utilize a higher allowable bearing pressure, alternative foundation support systems may be considered advantageous to undercutting/replacement within eastern portions of the parking ramp area, depending on final building details.*

In light of the conditions encountered on the site, our *preliminary* recommendations for site preparation, foundation, floor slab, below-grade wall and pavement design/construction, along with our assessment of the site class for seismic design, are presented in the following subsections. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

A building-specific, follow-up exploration program, consisting of supplemental borings and/or test pits, is highly recommended once the planned site and building layout, as well as other building-related details, have been finalized.

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1. Site Preparation

Demolition of a portion of the existing building in the western portion of the site will be required to facilitate the construction of the new pavement areas in Phase 1. We recommend the existing structure be demolished and removed in its entirety, including the floor slab, footings and below-grade walls (if any). After demolition, the subgrade soils should be checked for their pavement support suitability, as applicable. Existing structure elements can potentially remain in-place in pavement areas provided they are broken off at least 2 ft below proposed pavement subgrade elevations and do not interfere with new utility construction. Slabs and existing pavement that remain in-place below new pavement areas should be broken up (rubbelized/pulverized) to promote drainage. Otherwise, existing slabs and pavement should also be removed. Further, based on the past presence of structures in the southern portion of the site, exposed soils should be carefully evaluated following pavement removal and during excavation required for foundation construction at the parking ramp and Urban League building.

We further recommend that pavement (and topsoil/landscaping, where present) be stripped at least 10 ft beyond the proposed construction areas, including areas requiring fill beyond the building footprints and pavement limits. Trees and root zones should also be removed from construction areas prior to or in conjunction with site stripping.

After building demolition or pavement removal and cutting to grade, where required, subgrades are generally anticipated to consist of existing base course, granular fill, or perhaps natural clay soils. In areas remaining at-grade or requiring fill, we recommend cohesive and fine-grained subgrades be statically recompacted (i.e., without vibration) and subsequently proof-rolled with a piece of heavy rubber-tire construction equipment, such as a loaded tri-axle dump truck, to check for soft/yielding areas. If soft/yielding areas are observed, these soils should be undercut and replaced with granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) in accordance with our Recommended Compacted Fill Specifications presented in Appendix D. Alternatively, 3-in. dense graded base (DGB) that is placed in loose 10-in. lifts and compacted until deflection ceases can also be used to restore grades in undercut areas. Granular subgrades (if any) should be thoroughly recompacted with a vibratory smooth-drum roller, and zones that remain loose after recompaction should be undercut and replaced or stabilized as described above. Areas subsequently receiving fill should be checked for their pavement, floor slab and footing support suitability prior to fill placement, as applicable.

Following the development of a firm and stable subgrade, fill placement to establish site, pavement and building grades can proceed, as needed. To the extent possible, we recommend using granular soils (i.e., sands/gravels, including the native granular soils excavated on-site) as structural fill within the building envelopes and upper 2 ft in pavement areas because these soils are relatively easy to place and compact in most weather conditions compared to clay/silt soils. Clay and silt soils excavated on-site are generally not recommended as structural fill because moisture conditioning by discing and drying (aeration) will likely be required to achieve desired compaction levels, which is highly weather-dependent (i.e., dry, warm and windy conditions) and could delay construction

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progress. In our opinion, clay/silt soils are best used as fill in landscaping or potentially as lower lifts in pavement areas provided the moisture contents can be sufficiently lowered from the natural states to facilitate compaction efforts. We recommend that structural fill be compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) following Appendix D guidelines. Periodic field density tests should be taken by CGC staff within the fill to document the adequacy of compactive effort.

We recommend that excavation sidewalls, such as for mass-excavations to establish lower level grades, generally be sloped back according to OSHA requirements. The on-site clay and silt, as well as sand with significant silt content, typically classified as OSHA “Type B” soils, are anticipated to control excavation slopes, and slopes of 1.0H:1.0V are expected to be at least temporarily stable. Note that flatter side slopes may be required where cleaner sand seams (SP/SP-SM on boring logs) or perched or seeping water is present that destabilizes the side slopes. *The appropriate excavation side slopes should be determined by a competent person completing the earthwork in accordance with OSHA slope guidelines.* Where excavation limits are within fairly close proximity of the site perimeter or near existing buildings which will remain and adequate sloping is not possible, temporary shoring/earth retention may also be required. *We recommend shoring systems be designed by an appropriately qualified professional engineer.*

2. Preliminary Foundation Design

Since information pertaining to envisioned final building locations, elevations and structural loads were not available at the time of this report, foundation recommendations contained in this section should be considered preliminary. Once the planned site and building layout has been finalized, a site plan and building elevations should be provided to CGC for review. A supplemental, building-specific soil boring and/or test pit program should be developed and performed to more accurately evaluate the foundation conditions for each building. The following subsections include building-specific preliminary recommendations regarding foundation design and construction.

A. Parking Ramp and Urban League Building – Borings 1, 2 and 3

Based on existing site grades at the boring locations, we have assumed that finished first floor elevations of the parking ramp and Urban League building will be established between about EL 881 and 883 ft. Typical frost depth footings for structures *without a lower-level* are therefore expected to bear between about EL 876 and 878 ft. Interior footings, if any, may bear slightly shallower. Foundation design will be controlled by the medium stiff to stiff natural clay soils present at depths of about 2 to 7 ft below existing site grades at Borings 1 through 3. For footings which will bear within the ***natural clay soils***, and with the understanding that isolated undercutting of existing fill soils will be required (e.g., Boring 2), it is our opinion that an allowable bearing pressure of ***2,000 psf can be used for foundation design.***

Should a *lower-level* be included in the structure designs, finished lower-level slab elevations will likely be established 10 to 12 ft below existing site grades, or about EL 869 to 873 ft. Based on this

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assumption, lower-level footings would be expected to bear between about EL 866 to 870 ft. If a *lower-level* is included, foundation design will be controlled by the medium dense natural sands and silt (including highly weathered bedrock) encountered at below depths of about 12 ft at Boring 2 and about 8.5 ft at Boring 3. For footings which bear within at least ***medium dense natural sand/silt soils***, and with the understanding that isolated undercutting of loose sand or silt may be required (e.g., Boring 2), it is our opinion that an allowable bearing pressure of ***4,000 psf can be used for foundation design.***

Note that under either building design alternative (e.g., with or without a lower-level), if a higher bearing pressure is desired in order to reduce footing sizes, footings could be lowered or the loose/softer soils could be undercut to expose suitable soils, with grade restored with lean mix concrete or compacted coarse aggregate, depending on the bearing pressure utilized. For foundations bearing on at least medium dense sands present below a depth of about 6 to 13 ft at Borings 1 and 2, as well as 9 ft at Boring 3, a bearing pressure on the order of 4,000 psf could be utilized (the same as if a lower-level was included). If a bearing pressure of greater than 4,000 psf is desired, which may be the case for heavily loaded footings expected for the parking structure, footings could be designed to bear within the dense to very dense soils present below a depth of 6 ft at Boring 1 or below about 18.5 ft at Boring 2 (or unsuitable soils could be undercut/replaced with lean mix or coarse aggregate backfill).

Due to the depth to reach soils which would allow for the use of a pressure in excess of 4,000 psf near Boring 2, undercutting/lowering of the footing may not be economical, even with the inclusion of a lower-level. Therefore, if a bearing pressure in excess of 4,000 psf is desired, consideration could be given to supporting spread footings within the eastern portion of the parking ramp using an intermediate foundation system such as aggregate piers, with standard spread footings in the west bearing on suitable, dense to very dense soils (and weathered bedrock) or on aggregate/lean mix backfill following minor undercutting. Variability in the depth to soil/bedrock suitable for an increased bearing pressure should be expected and this alternative can be more closely explored following completion of supplemental borings, if desired.

B. Affordable Housing Building – Boring 4

Based on existing site grades in the vicinity of the planned Affordable Housing building, we have assumed that finished first floor elevation will be established near EL 890 ft, with the lower-level slab 10 to 12 ft below that, or between about EL 888 and 890 ft. Footings are therefore expected to bear between about EL 885 to 887 ft and foundation design will be controlled by the medium dense natural granular soils present below a depth of about 3 ft at Boring 4. For footings which will bear within the medium dense ***natural sand soils***, and with the understanding that isolated undercutting of existing fill and looser sand soils may be required, it is our opinion that an allowable bearing pressure of ***4,000 psf can be used for foundation design.***

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C. Addition Foundation Recommendations

Recognizing that soil conditions may vary between and beyond the widely-spaced borings, footing subgrades should be checked by a CGC field representative to document that the subgrade soils are suitable for footing support or otherwise advise on corrective measures, such as undercutting. We recommend using a smooth-edged backhoe bucket for footing and undercut excavations. Granular soils exposed at the bottom of footing and undercut excavations should be thoroughly recompacted with a large vibratory plate compactor or an excavator-mounted hoe-pack prior to backfilling or formwork/concrete placement to densify soils loosened during the excavation process. Soils potentially susceptible to disturbance from vibratory compaction (e.g. cohesive/fine-grained soils or sands that are saturated due to seepage from perched layers, etc.) should be hand-trimmed. OSHA slope guidelines should be followed if workers need to enter footing excavations.

Where undercutting is required, the base of the undercut excavations should be widened beyond the footing edges at least 0.5 ft in each direction for each foot of undercut depth for stress distribution purposes. For an allowable bearing pressure of up to 5,000 psf, footing grade can be restored using granular fill compacted to 95% compaction (ASTM D 1557) or compacted coarse aggregate (3-in. dense graded base, select crushed material or 3-in. dense graded base course, as described in Appendix D) that is placed in loose lifts of 10 in. or thinner and thoroughly compacted with a large vibratory compactor until deflection ceases. For bearing pressures between 5,000 and 7,000 psf, grade should be restored with compacted coarse aggregate or lean mix concrete (discussed below).

Where undercutting is required in order to utilize an allowable bearing pressures in excess of 7,000 psf, grade should be restored with lean mix concrete¹. When using lean mix concrete backfill, the undercut excavation should be oversized at least 0.5 ft beyond the footing edges and extended vertically to suitable bearing stratum. (OSHA sloping requirements should be followed if workers need to enter the excavation.)

Once the planned site and building layout has been finalized, a site plan and building elevations should be provided to CGC for review. A supplemental, building-specific soil boring program should be developed and performed to more accurately evaluate the foundation conditions for each building.

3. Seismic Site Class

In our opinion, the average soil properties in the upper 100 ft of the site (based on SPT blow counts, N-values, between 15 and 50 blows/ft, on average, in the granular soils underlying the site) may be characterized as a stiff soil profile. This characterization would place the site in Site Class D for seismic design according to the International Building Code and ASCE 7.

¹ Lean mix concrete should have a 28-day compressive strength (f'_c) of at least 1000 psi.

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4. Floor Slabs

In general, we anticipate that the floor slabs of below-grade parking levels will bear within the medium dense to dense sand soils, and slabs-on-grade will likely bear within the shallow clay or properly evaluated existing fill, or potentially on newly-placed structural fill where site grades need to be raised. Prior to slab construction, granular subgrade soils should be thoroughly recompact with a vibratory smooth-drum roller to densify soils that may become disturbed or loosened during construction activities. Cohesive and fine-grained subgrades should be statically recompact and subsequently proof-rolled to check for soft/yielding areas. Areas of disturbed soil or where soils remain loose after recompaction should be undercut and replaced with compacted 3-in. DGB or granular fill. We anticipate that floor slab subgrade improvement may be required below slab-on-grade areas where existing fill or natural clay soils are encountered, which may involve undercutting on the order of about 1 ft below floor slab subgrade elevations in these areas and subsequent backfilling with high-quality granular or aggregate backfill.

To act as a capillary break below the slabs, we recommend including a minimum 4 to 6-in. thick layer of well-graded sand/gravel with less than 5% by weight passing the No. 200 U.S. standard sieve. Note, however, that some structural engineers require a layer of DGB, such as 1¼-in. DGB, rather than sand/gravel below the floor slabs to increase the subgrade modulus immediately below the slabs. To further reduce the potential for moisture migration through the slabs, plastic vapor barriers can also be utilized. Fill and base layer material below the floor slabs should be placed as described in the Site Preparation section of this report. Slabs constructed on a minimum 6-in. thick dense graded base layer may be designed utilizing a subgrade modulus of 150 pci, and a subgrade modulus of 100 pci should be used for the design of a slabs that are constructed on a sand/gravel layer. The design subgrade moduli are based on a firm or adequately stabilized, recompact subgrade such that non-yielding conditions are developed. The slabs should be structurally separated from the footings with a compressible filler and have construction joints and reinforcement for crack control.

5. Below-Grade Walls

We anticipate that below-grade walls (where present) will be laterally supported by the lower-level slab and upper-level framing. Therefore, *at-rest* lateral earth pressures should be used during design of these walls. If lower-level walls, or perhaps site retaining walls at the lower-level entrance ramps are determined to not be laterally restrained from rotating, they should be designed for active earth pressures behind the wall and passive pressures in front of the walls.

To reduce the buildup of such pressures, high-quality backfill should be placed within 4 to 6 ft of the walls. We recommend that a perimeter drainage system be installed to intercept potential surface water infiltration and that the granular backfill be continuously connected to the drainage system, which discharges water by means of one or more sump pumps, or potentially daylights. The granular backfill should be well-graded sand or gravel having no more than 12% passing the No. 200 U.S. standard sieve (i.e., USCS designations SP, SP-SM, GP or GP-GM). The sands excavated on-

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site (typically denoted SM on the boring logs) contain higher amounts of fines and can potentially be used as wall backfill if a three-dimensional drainage board is included in the wall design. Soils containing cobbles/boulders should not be used in direct contact with below-grade walls. To impede the inflow of surface moisture, the final 2 ft of backfill in unpaved areas should consist of a clayey fill cap. The clayey cap (or pavement) should be graded to promote positive drainage away from the walls.

Before placing the wall backfill, the exterior walls should be damp-proofed with spray-applied or mopped-on rubber or bituminous sealer. Compaction of the backfill within 3 to 5 ft of the walls should be performed with lightweight equipment to avoid the development of excessive lateral earth pressures. The backfill should be compacted to a minimum of 93% modified Proctor following Appendix D guidelines. If shallow footings will be supported on the backfill, 95 percent compaction is recommended.

Lower-level walls constructed in accordance with the above recommendations may be designed for an equivalent fluid pressure of 55 psf per ft of depth (*at-rest* conditions) where walls are restrained from rotating, or equivalent fluid pressures of 35 psf/ft (*active* conditions) and 200 psf/ft (*passive* conditions) should be used in the wall design where walls are not restrained. The passive pressure value includes a safety factor of 2 to prevent excessive wall deflection. Additionally, the wall designs should also account for surcharge effects that could be applied during or after construction.

6. Pavement Design

We anticipate that pavement design will be controlled by existing mixed fill and stiff to very stiff clay soils, and subgrades should be prepared as described in the Site Preparation section of this report, with recompaction/proof-rolling completed prior to base course placement. We anticipate that asphalt pavement on this site will be exposed to primarily automobile traffic with less than one 18-kip equivalent single axle load (ESAL) per day. In view of this, we have assumed Traffic Class I following Wisconsin Asphalt Pavement Association (WAPA) recommendations for parking areas and driveways that are mainly used by light passenger vehicles. However, main sections of the driveways and approaches to the parking ramp and lower-levels (if included) are likely to experience heavier traffic loads. For pavement areas where trucks or more frequent vehicle traffic will routinely travel, we have assumed a traffic load of less than 5 ESALs per day and Traffic Class II according to WAPA. The pavement sections summarized in Table 1 were selected assuming a Soil Support Value “SSV” of about 4.0 for a firm or adequately stabilized clay subgrade and a design life of 20 years.

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TABLE 1 – Recommended Pavement Sections

Material	Thicknesses (in.)		WDOT Specification ⁽¹⁾
	Traffic Class I (Light Duty)	Traffic Class II (Medium Duty)	
Bituminous Upper Layer ^(2,3)	1.75	1.75	Section 460, Table 460-1
Bituminous Lower Layer ^(2,3)	1.75	2.25	Section 460. Table 460-1
Dense Graded Base Course ^(2,4)	10.0	10.0	Sections 301 and 305, 3 in. and 1¼ in.
Total Thickness	13.5	14.0	

Notes:

- 1) Wisconsin DOT *Standard Specifications for Highway and Structure Construction*, latest edition, including supplemental specifications, and *Wisconsin Asphalt Pavement Association 2020 Asphalt Pavement Design Guide*.
- 2) Compaction requirements:
 - Bituminous concrete: Refer to Section 460-3.
 - Base course: Refer to Section 301.3.4.2, Standard Compaction
- 3) Mixture Type LT (or E-0.3) bituminous; refer to Section 460, Table 460-2 of the *Standard Specifications*. Mixture Type LT bituminous is recommended in light-duty pavement areas heavier traffic areas with 50 ESALs or fewer; an MT mix may be required in truck traffic areas for higher traffic loads, and a heavier duty H mix (for either LT or MT) is recommended if high lateral wheel loads are expected; refer to Section 460, Table 460-2 of the *Standard Specifications*.
- 4) The upper 4 in. should consist of 1¼-in. DGB; the bottom part of the layer can consist of 3-in. DGB.

The recommended pavement sections assume regular maintenance (crack sealing, etc.) will occur, as needed. Note that if traffic volumes are greater than those assumed, CGC should be allowed to review the recommended pavement sections and adjust them accordingly. Alternative pavement designs may prove acceptable and should be reviewed by CGC. If there is a delay between subgrade preparation and placing the base course, the subgrade should be recompact.

Where concrete pavement may be used, such as in pavement areas subjected to concentrated wheel loads (e.g., ramp or lower-level approaches, dumpster pads, etc.), we recommend that the concrete be

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at least 6 in. thick and contain adequate reinforcement for crack control. Concrete slabs underlain by a minimum 6-in. thick dense graded base layer over a firm or stabilized subgrade can be designed utilizing a subgrade modulus of 150 pci.

CONSTRUCTION CONSIDERATIONS

Due to variations in weather, construction methods and other factors, specific construction problems are difficult to predict. Soil related difficulties which could be encountered on the site are discussed below:

- Due to the potentially sensitive nature of some of the on-site soils, we recommend that final site grading activities be completed during dry weather, if possible. Construction traffic should be avoided on prepared subgrades to minimize potential disturbance.
- Contingencies in the project budget for subgrade stabilization with coarse aggregate in pavement and floor slab areas should be increased if the project schedule requires that work proceed during adverse weather conditions.
- Earthwork construction during the late fall through early spring could be complicated as a result of wet weather and freezing temperatures. During cold weather, exposed subgrades should be protected from freezing before and after footing construction. Fill should never be placed while frozen or on frozen ground.
- Excavations extending greater than 4 ft in depth below the existing ground surface should be sloped or braced in accordance with current OSHA standards. Temporary earth retention/shoring could also be required for portions of the excavation, and shoring systems should be designed by an appropriately qualified professional engineer.
- Based on the observations made during our field exploration, we generally do not expect groundwater to be encountered during construction. However, water accumulating at the bottom of excavations as a result of precipitation or seepage should be quickly removed, with dewatering means and methods being the contractor's responsibility.

RECOMMENDED CONSTRUCTION MONITORING

The quality of the foundation, floor slab and pavement subgrades will be largely determined by the level of care exercised during site development. To check that earthwork and foundation construction proceed in accordance with our recommendations, the following operations should be monitored by CGC:

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- Topsoil stripping and subgrade proof-rolling/compaction;
- Fill/backfill placement and compaction;
- Foundation excavation/subgrade preparation; and
- Concrete placement.

FOLLOW-UP EXPLORATION PROGRAM

As previously noted, the limited subsurface exploration program that this report is based upon was preliminary in nature and intended to obtain a general overview of the on-site subsurface conditions. We highly recommend a supplemental subsurface exploration, involving building-specific soil borings be conducted once the planned site and building layout has been finalized. We can provide a proposal for the supplemental exploration program and an addendum to this preliminary geotechnical exploration report at the appropriate time.

* * * * *

It has been a pleasure to serve you on this project. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.



Alex J. Bina, P.E.
Project Engineer



Michael N. Schultz, P.E.
Principal/Consulting Professional

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring Location Exhibit (2)
Logs of Test Borings (4)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications
Appendix D - Recommended Compacted Fill Specifications

APPENDIX A

FIELD EXPLORATION

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APPENDIX A

FIELD EXPLORATION

Subsurface conditions for this preliminary study were explored by drilling four Standard Penetration Test (SPT) soil borings that were sampled at 2.5-ft intervals to a depth of 10 ft, and at 5-ft intervals thereafter. The soil samples were obtained in general accordance with specifications for standard penetration testing, ASTM D 1586. The specific procedures used for drilling and sampling are described below.

1. Boring Procedures between Samples

The boring is extended downward, between samples, by a hollow-stem auger.

2. Standard Penetration Test and Split-Barrel Sampling of Soils
(ASTM Designation: D 1586)

This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of borings and is known as the Standard Penetration Resistance.

During the field exploration, the driller visually classified the soil and prepared a field log. *Field screening of the soil samples for possible environmental contaminants was not conducted by the driller as these services were not part of CGC's work scope.* Water level observations were made in each boring during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the borings were backfilled with bentonite to satisfy WDNR regulations and the soil samples were delivered to our laboratory for visual classification. The soils were visually classified by a geotechnical engineer using the Unified Soil Classification System. The final logs prepared by the engineer, along with a Soil Boring Location Exhibit and a description of the Unified Soil Classification System are presented in Appendix B.

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APPENDIX B

SOIL BORING LOCATION EXHIBIT (2)
LOGS OF TEST BORINGS (4)
LOG OF TEST BORING-GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM

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Legend

☩ Denotes Boring Location

Notes:

1. Base map obtained provided by City of Madison..
2. Locations are approximate.
3. Soil borings performed by Badger State Drilling April 29, 2021.

Scale: Reduced

Job No.
C21192

Date:
5/2021


CGC, Inc.

BORING LOCATION EXHIBIT
Village on Park Development
2300 S. Park Street
Madison, WI



Legend
 ⚓ Denotes Boring Location

- Notes:**
1. Base map obtained from Google Maps.
 2. Locations are approximate.
 3. Soil borings performed by Badger State Drilling April 29, 2021.

Job No. C21192		BORING LOCATION EXHIBIT Village on Park Development 2300 S. Park Street Madison, WI
Date: 5/2021		



LOG OF TEST BORING

Project **Village on Park Development**
2300 S. Park Street
Location **Madison, WI**

Boring No. **B-1**
Surface Elevation (ft) **882±**
Job No. **C21192**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N		qu (qa) (tsf)	W	LL	PL	LOI
					3.5 in. Asphalt Pavement/10 in. Base Course					
1		17	M	6	Stiff, Brown Sandy Lean CLAY (CL)	(1.25)	26.5			
2		14	M	6		(1.0)	15.7			
3		16	M	45	Dense, Reddish to Pinkish-White Fine to Medium SAND, Little Silt, Trace Gravel (SP-SM - Possible Highly Weathered Sandstone Bedrock)					
4		14	M	40						
5		18	M	17	Medium Dense to Very Dense, Dark Brown to Greenish-Brown Laminated SILT and SAND, Trace Gravel (ML/SP - Probable Weathered Sandstone Bedrock)					
6		0	W	50/5"						
7		3	W	50/3"						
					End Boring/Auger Refusal at 27± ft on Probable Sandstone Bedrock					
					Borehole Backfilled with Bentonite Chips and Asphalt Patch					

WATER LEVEL OBSERVATIONS					GENERAL NOTES				
While Drilling	22.0'	Upon Completion of Drilling	21'		Start	4/29/21	End	4/29/21	
Time After Drilling			30 Mins.		Driller	BSD	Chief	MC	Rig CME-55
Depth to Water			21'		Logger	CAM	Editor	AJB	
Depth to Cave in					Drill Method	2.25" HSA; Autohammer			
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.									



LOG OF TEST BORING

Project **Village on Park Development**
2300 S. Park Street
Location **Madison, WI**

Boring No. **B-3**
Surface Elevation (ft) **883±**
Job No. **C21192**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES					
No.	TYPE	Rec (in.)	Moist	N		Depth (ft)	qu (qa) (tsf)	W	LL	PL	LOI
						4 in. Asphalt Pavement/8 in. Base Course					
1		8	M	11		FILL: Brown Fine to Medium Sand, Little Some Silt and Gravel					
2		10	M	3		Stiff, Brown Sandy Lean CLAY (CL)					
					5		(1.0)	27.2			
3		12	M	6		Loose, Dark Brown Silty Fine to Medium SAND, Little Clay (SM)					
4		0	M	17		Medium Dense, Light Brown Fine to Medium SAND, Some Silt, Trace Gravel, with Thin Silt Seams (SM)					
					10						
5		14	M	13							
					15						
6		14	M	17							
					20						
7		4	M	50/2"		Very Dense, Brown Fine to Medium SAND, Some Silt and Gravel, with Thin Greenish-Brown Thin Silt and Clay Seams (SM - Probable Weathered Bedrock)					
					25	End Boring/Auger Refusal at 25 ft on Probable Sandstone Bedrock					
					30	Borehole Backfilled with Bentonite Chips and Asphalt Patch					
					35						
WATER LEVEL OBSERVATIONS						GENERAL NOTES					
While Drilling <input checked="" type="checkbox"/> NW Upon Completion of Drilling <input checked="" type="checkbox"/> NW						Start 4/29/21 End 4/29/21					
Time After Drilling _____						Driller BSD Chief MC Rig CME-55					
Depth to Water _____						Logger CAM Editor AJB					
Depth to Cave in _____						Drill Method 2.25" HSA; Autohammer					
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.											



LOG OF TEST BORING

Project **Village on Park Development**
2300 S. Park Street
Location **Madison, WI**

Boring No. **B-4**
Surface Elevation (ft) **889±**
Job No. **C21192**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks		SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)			qu (qa) (tsf)	W	LL	PL	LOI
						<div><div></div></div>	3 in. Asphalt Pavement/8 in. Base Course					
1		14	M	9		<div><div></div></div>	Loose, Brown Fine to Medium SAND, Little Silt, Trace Gravel (SP-SM - Possible Fill)					
2		14	M	15			Medium Dense, Brown Fine to Coarse SAND, Some Gravel, Trace Silt (SP)					
3		16	M	22								
4		12	M	20								
5		15	M	21			Medium Dense, Light Brown Fine SAND, Some Silt, Trace Gravel, with Thin Silt Seams (SM)					
							End Boring/Auger Refusal at 18 ft					
							Borehole Backfilled with Bentonite Chips and Asphalt Patch					

WATER LEVEL OBSERVATIONS					GENERAL NOTES				
While Drilling	∇	NW	Upon Completion of Drilling	NW	Start	4/29/21	End	4/29/21	
Time After Drilling					Driller	BSD	Chief	MC	Rig CME-55
Depth to Water					Logger	CAM	Editor	AJB	
Depth to Cave in					Drill Method	2.25" HSA; Autohammer			
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.									

CGC, Inc.

Madison - Milwaukee

Unified Soil Classification System

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS

(more than 50% of material is larger than No. 200 sieve size)

Clean Gravels (Less than 5% fines)



GW

Well-graded gravels, gravel-sand mixtures, little or no fines



GP

Poorly-graded gravels, gravel-sand mixtures, little or no fines

Gravels with fines (More than 12% fines)



GM

Silty gravels, gravel-sand-silt mixtures



GC

Clayey gravels, gravel-sand-clay mixtures

Clean Sands (Less than 5% fines)



SW

Well-graded sands, gravelly sands, little or no fines



SP

Poorly graded sands, gravelly sands, little or no fines

Sands with fines (More than 12% fines)



SM

Silty sands, sand-silt mixtures



SC

Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS

(50% or more of material is smaller than No. 200 sieve size.)



ML

Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity



CL

Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays



OL

Organic silts and organic silty clays of low plasticity



MH

Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts



CH

Inorganic clays of high plasticity, fat clays



OH

Organic clays of medium to high plasticity, organic silts



PT

Peat and other highly organic soils

LABORATORY CLASSIFICATION CRITERIA

GW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3

GP Not meeting all gradation requirements for GW

GM Atterberg limits below "A" line or P.I. less than 4

Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols

GC Atterberg limits above "A" line or P.I. greater than 7

SW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3

SP Not meeting all gradation requirements for GW

SM Atterberg limits below "A" line or P.I. less than 4

Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols

SC Atterberg limits above "A" line with P.I. greater than 7

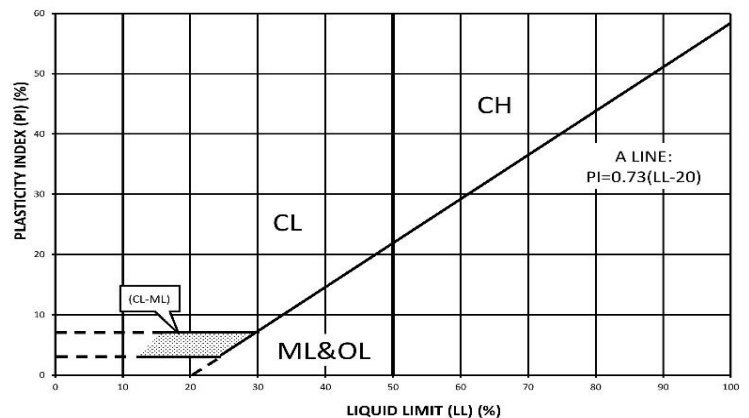
Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent GW, GP, SW, SP

More than 12 percent GM, GC, SM, SC

5 to 12 percent Borderline cases requiring dual symbols

PLASTICITY CHART



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APPENDIX C

DOCUMENT QUALIFICATIONS

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APPENDIX C

DOCUMENT QUALIFICATIONS

I. GENERAL RECOMMENDATIONS/LIMITATIONS

CGC, Inc. should be provided the opportunity for a general review of the final design and specifications to confirm that earthwork and foundation requirements have been properly interpreted in the design and specifications. CGC should be retained to provide soil engineering services during excavation and subgrade preparation. This will allow us to observe that construction proceeds in compliance with the design concepts, specifications and recommendations, and also will allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction. CGC does not assume responsibility for compliance with the recommendations in this report unless we are retained to provide construction testing and observation services.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and no other warranties are expressed or implied. The opinions and recommendations submitted in this report are based on interpretation of the subsurface information revealed by the test borings indicated on the location plan. The report does not reflect potential variations in subsurface conditions between or beyond these borings. Therefore, variations in soil conditions can be expected between the boring locations and fluctuations of groundwater levels may occur with time. The nature and extent of the variations may not become evident until construction.

II. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes. While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

READ THE FULL REPORT

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *CGC cannot accept responsibility or liability for problems that occur because our reports do not consider developments of which we were not informed.*

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINION

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most

effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the confirmation-dependent recommendations included in your report. *Those confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *CGC cannot assume responsibility or liability for the report's confirmation-dependent recommendations if we do not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical engineering report. Confront that risk by having CGC participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

DO NOT REDRAW THE ENGINEER'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

GIVE CONSTRUCTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and constructors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic

expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineer's responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

ENVIRONMENTAL CONCERNS ARE NOT COVERED

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

OBTAIN PROFESSIONAL ASSISTANCE TO DEAL WITH MOLD

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention.* *Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

RELY ON YOUR GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Membership in the Geotechnical Business Council (GBC) of Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with CGC, a member of GBC, for more information.

Modified and reprinted with permission from:

Geotechnical Business Council
of the Geoprofessional Business Association
8811 Colesville Road, Suite G 106
Silver Spring, MD 20910

APPENDIX D

RECOMMENDED COMPACTED FILL SPECIFICATIONS

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APPENDIX D

CGC, INC.

RECOMMENDED COMPACTED FILL SPECIFICATIONS

General Fill Materials

Proposed fill shall contain no vegetation, roots, topsoil, peat, ash, wood or any other non-soil material which by decomposition might cause settlement. Also, fill shall never be placed while frozen or on frozen surfaces. Rock, stone or broken concrete greater than 6 in. in the largest dimension shall not be placed within 10 ft of the building area. Fill used greater than 10 ft beyond the building limits shall not contain rock, boulders or concrete pieces greater than a 2 sq ft area and shall not be placed within the final 2 ft of finish subgrade or in designated utility construction areas. Fill containing rock, boulders or concrete pieces should include sufficient finer material to fill voids among the larger fragments.

Special Fill Materials

In certain cases, special fill materials may be required for specific purposes, such as stabilizing subgrades, backfilling undercut excavations or filling behind retaining walls. For reference, WisDOT gradation specifications for various types of granular fill are attached in Table 1.

Placement Method

The approved fill shall be placed, spread and leveled in layers generally not exceeding 10 in. in thickness before compaction. The fill shall be placed at moisture content capable of achieving the desired compaction level. For clay soils or granular soils containing an appreciable amount of cohesive fines, moisture conditioning will likely be required.

It is the Contractor's responsibility to provide all necessary compaction equipment and other grading equipment that may be required to attain the specified compaction. Hand-guided vibratory or tamping compactors will be required whenever fill is placed adjacent to walls, footings, columns or in confined areas.

Compaction Specifications

Maximum dry density and optimum moisture content of the fill soil shall be determined in accordance with modified Proctor methods (ASTM D1557). The recommended field compaction as a percentage of the maximum dry density is shown in Table 2. Note that these compaction guidelines would generally not apply to coarse gravel/stone fill. Instead, a method specification would apply (e.g., compact in thin lifts with a vibratory compactor until no further consolidation is evident).

Testing Procedures

Representative samples of proposed fill shall be submitted to CGC, Inc. for optimum moisture-maximum density determination (ASTM D1557) prior to the start of fill placement. The sample size should be approximately 50 lb.

CGC, Inc. shall be retained to perform field density tests to determine the level of compaction being achieved in the fill. The tests shall generally be conducted on each lift at the beginning of fill placement and at a frequency mutually agreed upon by the project team for the remainder of the project.

Table 1
Gradation of Special Fill Materials

Material	WisDOT Section 311	WisDOT Section 312	WisDOT Section 305			WisDOT Section 209		WisDOT Section 210
	Breaker Run	Select Crushed Material	3-in. Dense Graded Base	1 1/4-in. Dense Graded Base	3/4-in. Dense Graded Base	Grade 1 Granular Backfill	Grade 2 Granular Backfill	Structure Backfill
Sieve Size	Percent Passing by Weight							
6 in.	100							
5 in.		90-100						
3 in.			90-100					100
1 1/2 in.		20-50	60-85					
1 1/4 in.				95-100				
1 in.					100			
3/4 in.			40-65	70-93	95-100			
3/8 in.				42-80	50-90			
No. 4			15-40	25-63	35-70	100 (2)	100 (2)	25-100
No. 10		0-10	10-30	16-48	15-55			
No. 40			5-20	8-28	10-35	75 (2)		
No. 100						15 (2)	30 (2)	
No. 200			2-12	2-12	5-15	8 (2)	15 (2)	15 (2)

Notes:

1. Reference: Wisconsin Department of Transportation *Standard Specifications for Highway and Structure Construction*.
2. Percentage applies to the material passing the No. 4 sieve, not the entire sample.
3. Per WisDOT specifications, both breaker run and select crushed material can include concrete that is 'substantially free of steel, building materials and other deleterious material'.

Table 2
Compaction Guidelines

Area	Percent Compaction (1)	
	Clay/Silt	Sand/Gravel
<u>Within 10 ft of building lines</u>		
Footing bearing soils	93 - 95	95
Under floors, steps and walks		
- Lightly loaded floor slab	90	90
- Heavily loaded floor slab and thicker fill zones	92	95
<u>Beyond 10 ft of building lines</u>		
Under walks and pavements		
- Less than 2 ft below subgrade	92	95
- Greater than 2 ft below subgrade	90	90
Landscaping	85	90

Notes:

1. Based on Modified Proctor Dry Density (ASTM D 1557)



Construction • Geotechnical
Consulting Engineering/Testing

October 4, 2021
C21476

Mr. Edward Lee
Urban League of Greater Madison
2222 S. Park Street, Suite 200
Madison, WI 53713

Re: Geotechnical Exploration Report
ULGM Villager on Park
2352 South Park Street
Madison, Wisconsin

Dear Mr. Lee:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the subsurface exploration program for the above-referenced project. The purpose of this program was to characterize the subsurface conditions on the site and to provide geotechnical recommendations regarding site preparation, foundation, floor slab, below-grade wall and pavement design/construction. A determination of the site class for seismic design and a stormwater infiltration potential discussion are also included. We are sending you an electronic copy of this report, and we can provide paper copies upon request. Copies have also been forwarded to Mr. Kevin Yeska of JSD Professional Services and Mr. Kirk Biodrowski of JLA Architects.

PROJECT AND SITE DESCRIPTION

We understand that a multi-story office building (Villager on Park) is planned within the southeast portion of the Village on Park property, generally located at 2300 S. Park Street in Madison. The area of the planned new structure is currently comprised of an asphalt-paved parking lot. Based on the provided Alta Survey of the Village on Park development, existing site grades are fairly flat, and appear to vary between about EL 884 and 881.5 in the area of the planned new building. The proposed redevelopment layout is shown on a Boring & Test Pit Location Exhibit presented in Appendix B.

Based on the limited information available at the time of this report, we understand that the structure will be up to four stories above grade, with one level of below-grade parking also being considered. Reconfiguration of the existing parking lot will result from the construction of the new building. An underground stormwater system, comprised of ADS Stormtech chambers, is also planned along the north side of the proposed building.

Specific information pertaining to building and site elevations and structural loads were not available at the time of this report. However, for purposes of this evaluation, we have assumed the finished first floor elevation to be near existing site grades at about EL 882, and the below-grade slab (if

included) to be at about EL 872. We also expect moderate structural loads for the planned multi-story building.

Based on a provided draft of the Materials Management Plan prepared by SCS Engineers for this development, a gas station was formerly located in the southeast portion of the planned development area. The station reportedly operated through the mid-2000s, prior to its demolition. A leaking underground storage tank (LUST) resulting in petroleum-impacted soils and groundwater was identified in the late 1990s. Following remedial efforts, it is understood that residual soil and groundwater contamination likely remain on this site.

SUBSURFACE CONDITIONS

Subsurface conditions for this study were planned to be explored by drilling four (4) Standard Penetration Test (SPT) soil borings to planned depths of up to 30 ft at locations selected by the project team and field-staked by CGC. However, with the exception of Boring 2, which was completed to the planned depth, auger refusal on probable bedrock was experienced within the remaining borings at depths between about 20 to 25 ft. The soil borings were conducted by Badger State Drilling (under subcontract to CGC) on September 20, 2021 using a truck-mounted CME-55 rotary drill rig equipped with hollow stem augers and an automatic SPT hammer.

In addition to the soil borings, a test pit was performed on September 22, 2021 within the area of the proposed stormwater system, which was comprised of a landscaped island. The test pit was excavated by Hellenbrand Brothers Excavating personnel (under subcontract to CGC) and logged and sampled in the field by CGC. The test pit was extended to the planned depth of 10 ft below existing site grade.

The specific procedures used for drilling and sampling are described in Appendix A and the boring and test pit locations are shown in plan on the Boring & Test Pit Location Exhibit presented in Appendix B. Ground surface elevations at the boring and test pit locations were estimated by CGC based on topographic contours included as part of the provide Alta Survey, and the elevations should therefore be considered approximate.

The subsurface profiles at the boring locations were fairly consistent, and the following strata were typically encountered (in descending order):

- About 13 to 14 in. of **pavement layers**, including 3 to 7 in. of *asphalt* over 7 to 10 in. of *base course*; underlain by
- Approximately 1 to 11 ft of **fill**, generally comprised of granular (sand) soils, with occasional intermixed clay; followed by
- About 2 to 5 ft of medium stiff to very stiff **lean clay**; over

- Very loose to very dense *sand* and *silt* soils, with the sand containing varying amounts of silt and gravel. The sand and/or silt soils typically increased in relative density with depth and were classified as *probable weathered bedrock* at Borings 2, 3 and 4. These soils extended to depths of 20 to 30 ft below existing site grades, where the borings were terminated or where auger refusal occurred on probable bedrock.

As an exception to the above generalized soil profile, the surface at Boring 4 was comprised of about 6 in. of wood landscape mulch. Additionally, the *fill* materials encountered in Boring 4 below a depth of about 6 ft appeared to primarily consist of *pea gravel*, which is typically used to backfill excavations resulting from underground storage tank removals. This observation appears to align with the location of the UST we understand was present on this site.

The soil profile encountered in the test pit (TP-1) was fairly consistent with the soil conditions encountered in the soil borings. As an exception, an approximately 3-ft thick stratum of *organic silt* was encountered below a depth of about 2± ft.

Representative samples obtained from the clay soils were tested for their natural moisture contents, which ranged from 25.0% to 28.7% in the analyzed specimens. Based on natural moisture contents, pocket penetrometer readings (q_p -values; an estimate of the unconfined compressive strength of cohesive soils) and SPT blow counts (N-values), the clays should be considered slightly to moderately compressible. Additionally, organic content testing (via loss-on-ignition) was performed on a portion of the dark gray clay soil encountered in Boring 1 and the organic silt soil encountered in Test Pit 1, which yielded organic contents of 4.9 and 5.9%, respectively. For reference, soils with an organic content of 4% or more are considered organic.

A sample of the native granular soils encountered within Test Pit 1 was subjected to a particle size distribution test (gradation) to aid in its USCS and USDA classifications. The results of the gradation performed are provided on the Particle Size Distribution Report enclosed in Appendix A.

Groundwater appears to have been present below a depth of about 28.5 ft in Boring 2. However, groundwater was not encountered in the remaining soil borings or test pit above the depths explored. Groundwater levels are generally expected to fluctuate with seasonal variations in precipitation, infiltration, evapotranspiration, the level in nearby waterbodies and other factors. A more detailed description of the site soil and groundwater conditions is presented on the Soil Boring Logs attached in Appendix B.

DISCUSSION AND RECOMMENDATIONS

Subject to the limitations discussed below and based on the subsurface exploration, it is our opinion that the site is generally suitable for the proposed construction, and that the planned building can be supported by a conventional spread footing foundation system. *However, based on the presence of*

existing fills, as well as zones of very loose sand / silt and softer clay soils, selective undercutting of lower-strength to marginal soils may be required below the bottom of some footings, especially if a below-grade level is not planned to be constructed.

Our recommendations for site preparation, foundation, floor slab, below-grade wall and pavement design/construction, along with our assessment of the site class for seismic design and a stormwater infiltration discussion, are presented in the following subsections. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

1. Site Preparation

We recommend that pavement (and topsoil/landscaping, where present) be stripped at least 10 ft beyond the proposed construction areas, including areas requiring fill beyond the building footprints and pavement limits. Trees and root zones should also be removed from construction areas prior to or in conjunction with site stripping.

After pavement removal, subgrades are generally anticipated to consist of existing base course, granular fill, or potentially natural clay or organic silt soils. Where present within the planned building footprint and pavement areas, removal of organic silt soils is recommended. Based on the past presence of a gas station and associated environmental remediation efforts (i.e. UST removal) in the southeastern portion of the site, exposed soils should be carefully evaluated following pavement removal and during foundation excavation work.

In areas remaining at-grade or requiring fill, we recommend cohesive and fine-grained subgrades be statically recompacted (i.e., without vibration) and subsequently proof-rolled with a piece of heavy rubber-tire construction equipment, such as a loaded tri-axle dump truck, to check for soft/yielding areas. If soft/yielding areas are observed, these soils should be undercut and replaced with granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) in accordance with our Recommended Compacted Fill Specifications presented in Appendix D. Alternatively, 3-in. dense graded base (DGB) that is placed in loose 10-in. lifts and compacted until deflection ceases can also be used to restore grades in undercut areas. Granular subgrades (if any) should be thoroughly recompacted with a vibratory smooth-drum roller, and zones that remain loose after recompaction should be undercut and replaced or stabilized as described above. Areas subsequently receiving fill should be checked for their pavement, floor slab and footing support suitability prior to fill placement, as applicable.

Following the development of a firm and stable subgrade, fill placement to establish site, pavement and building grades can proceed, as needed. To the extent possible, we recommend using granular soils (i.e., sands/gravels, including the native granular soils excavated on-site) as structural fill within the building envelopes and upper 2 ft in pavement areas because these soils are relatively easy to place and compact in most weather conditions compared to clay/silt soils. Clay and silt soils excavated on-site are generally not recommended as structural fill because moisture conditioning by

discing and drying (aeration) will likely be required to achieve desired compaction levels, which is highly weather-dependent (i.e., dry, warm and windy conditions) and could delay construction progress. In our opinion, clay/silt soils are best used as fill in landscaping or potentially as lower lifts in pavement areas provided the moisture contents can be sufficiently lowered from the natural states to facilitate compaction efforts. We recommend that structural fill be compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) following Appendix D guidelines. Periodic field density tests should be taken by CGC staff within the fill to document the adequacy of compactive effort.

We recommend that excavation sidewalls, such as for mass-excavations to establish lower-level grades (if planned), generally be sloped back according to OSHA requirements. The on-site clay and silt, as well as sand with significant silt content, typically classified as OSHA “Type B” soils, are anticipated to control excavation slopes, and slopes of 1.0H:1.0V are expected to be at least temporarily stable. Note that flatter side slopes may be required where cleaner sand seams (SP/SP-SM on boring logs) or perched or seeping water is present that destabilizes the side slopes. *The appropriate excavation side slopes should be determined by a competent person completing the earthwork in accordance with OSHA slope guidelines.* Where excavation limits encroach upon street right-of-ways and adequate sloping is not possible, temporary shoring/earth retention will likely be required. *We recommend shoring systems be designed by an appropriately qualified professional engineer.*

2. **Foundation Design**

Based on an assumed finished first floor elevation of EL 882 and *no below-grade level being planned*, perimeter frost depth footings are anticipated to bear between about EL 877 and 878 ft. Interior footings, if any, would likely bear slightly shallower. Foundation design will be controlled by the medium stiff to stiff natural clay and underlying loose sand / silt soils present. For footings which will bear within the ***natural clay soils***, and with the understanding that isolated undercutting of existing fill soils will be required (e.g., Boring 4), it is our opinion that an allowable bearing pressure of ***2,000 psf can be used for foundation design where footings bear above EL 871.***

Should a *below-grade level* be included, the finished below-grade slab elevation is assumed to be at about EL 872. Based on this assumption, lower-level footings would be expected to bear between about EL 871 to 869 ft. Foundation design of lower-level footings will be controlled by the medium dense natural sands and silt. For footings which bear within at least ***medium dense natural sand/silt soils***, and with the understanding that isolated undercutting of existing fill and/or medium stiff sandy lean clay (e.g. Boring 4) may be required, it is our opinion that an allowable bearing pressure of ***4,000 psf can be used for foundation design where footings bear below about EL 871.***

Note that under either building design alternative (e.g., with or without a below-grade level), if a higher bearing pressure is desired in order to reduce footing sizes, footings could be lowered or the loose/softer soils could be undercut to expose suitable soils, with grade restored with lean mix

concrete or compacted coarse aggregate, depending on the bearing pressure utilized. CGC can provide additional detail and guidance on this, if desired.

Recognizing that soil conditions may vary between and beyond the borings, footing subgrades should be checked by a CGC field representative to document that the subgrade soils are suitable for footing support or otherwise advise on corrective measures, such as undercutting. We recommend using a smooth-edged backhoe bucket for footing and undercut excavations. Granular soils exposed at the bottom of footing and undercut excavations should be thoroughly recompacted with a large vibratory plate compactor or an excavator-mounted hoe-pack prior to backfilling or formwork/concrete placement to densify soils loosened during the excavation process. Soils potentially susceptible to disturbance from vibratory compaction (e.g. cohesive/fine-grained soils or sands that are saturated due to seepage from perched layers, etc.) should be hand-trimmed. OSHA slope guidelines should be followed if workers need to enter footing excavations.

Where undercutting is required, the base of the undercut excavations should be widened beyond the footing edges at least 0.5 ft in each direction for each foot of undercut depth for stress distribution purposes. Footing grade can be restored using granular fill compacted to 95% compaction (ASTM D 1557) or compacted coarse aggregate (3-in. dense graded base, select crushed material or 3-in. dense graded base course, as described in Appendix D) that is placed in loose lifts of 10 in. or thinner and thoroughly compacted with a large vibratory compactor until deflection ceases.

As an alternative to granular backfill, undercut excavations could be restored with lean mix concrete¹. When using lean mix concrete backfill, the undercut excavation should be oversized at least 0.5 ft beyond the footing edges and extended vertically to suitable bearing stratum. OSHA sloping requirements should be followed if workers need to enter the excavation.

3. Seismic Site Class

In our opinion, the average soil properties in the upper 100 ft of the site (based on SPT blow counts, N-values, between 15 and 50 blows/ft, on average, in the granular soils underlying the site) may be characterized as a stiff soil profile. This characterization would place the site in Site Class D for seismic design according to the International Building Code and ASCE 7.

4. Floor Slab

In general, we anticipate that the floor slab of a below-grade parking level (if elected) will bear within the medium dense to dense sand / silt soils, and a slab-on-grade would likely bear upon the shallow clay or properly evaluated existing fill, or potentially on newly-placed structural fill where site grades need to be raised. Prior to slab construction, granular subgrade soils should be thoroughly recompacted with a vibratory smooth-drum roller to densify soils that may become disturbed or loosened during construction activities. Cohesive and fine-grained subgrades should be

¹ Lean mix concrete should have a 28-day compressive strength (f'_c) of at least 1000 psi.

statically recompacted and subsequently proof-rolled to check for soft/yielding areas. Areas of disturbed or organic soil, or where soils remain loose after recompaction, should be undercut and replaced with compacted 3-in. DGB or granular fill. We anticipate that floor slab subgrade improvement may be required below slab-on-grade areas where existing fill or natural clay soils are encountered, which may involve undercutting and subsequent backfilling with high-quality granular or aggregate backfill. Careful evaluation of the slab subgrade within the area of the former gas station and UST(s) will be imperative, as the existing fill materials extended to a depth of about 12 ft.

To act as a capillary break below the slabs, we recommend including a minimum 4 to 6-in. thick layer of well-graded sand/gravel with less than 5% by weight passing the No. 200 U.S. standard sieve. Note, however, that some structural engineers require a layer of DGB, such as 1¼-in. DGB, rather than sand/gravel below the floor slabs to increase the subgrade modulus immediately below the slabs. To further reduce the potential for moisture migration through the slabs, plastic vapor barriers can also be utilized. Fill and base layer material below the floor slabs should be placed as described in the Site Preparation section of this report. Slabs constructed on a minimum 6-in. thick dense graded base layer may be designed utilizing a subgrade modulus of 150 pci, and a subgrade modulus of 100 pci should be used for the design of a slabs that are constructed on a sand/gravel layer. The design subgrade moduli are based on a firm or adequately stabilized, recompacted subgrade such that non-yielding conditions are developed. The slabs should be structurally separated from the footings with a compressible filler and have construction joints and reinforcement for crack control.

Given the potential presence for residual contaminated soil to remain on this site, the project environmental consultant should be contacted to determine whether an active or passive venting system is warranted below the structure to prevent the infiltration of potentially hazardous gases into the building.

5. Below-Grade Walls

If a lower-level is planned, we anticipate that below-grade walls will be laterally supported by the below-grade level slab and upper-level framing. Therefore, *at-rest* lateral earth pressures should be used during design of these walls. If below-grade walls, or perhaps site retaining walls at the lower-level entrance ramps are determined to not be laterally restrained from rotating, they should be designed for active earth pressures behind the wall and passive pressures in front of the walls.

To reduce the buildup of lateral pressures, high-quality backfill should be placed within 4 to 6 ft of the walls. We recommend that a perimeter drainage system be installed to intercept potential surface water infiltration and that the granular backfill be continuously connected to the drainage system, which discharges water by means of one or more sump pumps, or potentially daylights. The granular backfill should be well-graded sand or gravel having no more than 12% passing the No. 200 U.S. standard sieve (i.e., USCS designations SP, SP-SM, GP or GP-GM). The sands excavated on-

site (typically denoted SM on the boring logs) contain higher amounts of fines and can potentially be used as wall backfill if a three-dimensional drainage board is included in the wall design. Soils containing cobbles/boulders should not be used in direct contact with below-grade walls. To impede the inflow of surface moisture, the final 2 ft of backfill in unpaved areas should consist of a clayey fill cap. The clayey cap (or pavement) should be graded to promote positive drainage away from the walls.

Before placing the wall backfill, the exterior walls should be damp-proofed with spray-applied or mopped-on rubber or bituminous sealer. Compaction of the backfill within 3 to 5 ft of the walls should be performed with lightweight equipment to avoid the development of excessive lateral earth pressures. The backfill should be compacted to a minimum of 93% modified Proctor following Appendix D guidelines. If shallow footings will be supported on the backfill, 95 percent compaction is recommended.

Below-grade walls constructed in accordance with the above recommendations may be designed for an equivalent fluid pressure of 55 psf per ft of depth (*at-rest* conditions) where walls are restrained from rotating, or equivalent fluid pressures of 35 psf/ft (*active* conditions) and 200 psf/ft (*passive* conditions) should be used in the wall design where walls are not restrained, such as site retaining walls. The passive pressure value includes a safety factor of 2 to prevent excessive wall deflection. Additionally, the wall designs should also account for surcharge effects that could be applied during or after construction.

6. Pavement Design

We anticipate that pavement design will be controlled by existing mixed fill and stiff to very stiff clay soils, and subgrades should be prepared as described in the Site Preparation section of this report, with recompaction/proof-rolling completed prior to base course placement. We anticipate that asphalt pavement on this site will be exposed to primarily automobile traffic with less than one 18-kip equivalent single axle load (ESAL) per day. In view of this, combined with greater than 50 parking stalls being present, we have assumed Traffic Class II following Wisconsin Asphalt Pavement Association (WAPA) recommendations for parking areas and driveways. The pavement section summarized in Table 1 was selected assuming a Soil Support Value “SSV” of about 4.0 for a firm or adequately stabilized clay subgrade and a design life of 20 years.

TABLE 1 – Recommended Pavement Sections

Material	Thicknesses (in.)	WDOT Specification ⁽¹⁾
	Traffic Class II (Medium Duty)	
Bituminous Upper Layer ^(2,3)	1.75	Section 460, Table 460-1
Bituminous Lower Layer ^(2,3)	2.25	Section 460, Table 460-1
Dense Graded Base Course ^(2,4)	10.0	Sections 301 and 305, 3 in. and 1¼ in.
Total Thickness	14.0	

Notes:

- 1) Wisconsin DOT *Standard Specifications for Highway and Structure Construction*, latest edition, including supplemental specifications, and *Wisconsin Asphalt Pavement Association 2020 Asphalt Pavement Design Guide*.
- 2) Compaction requirements:
 - Bituminous concrete: Refer to Section 460-3.
 - Base course: Refer to Section 301.3.4.2, Standard Compaction
- 3) Mixture Type LT (or E-0.3) bituminous; refer to Section 460, Table 460-2 of the *Standard Specifications*.
- 4) The upper 4 in. should consist of 1¼-in. DGB; the bottom part of the layer can consist of 3-in. DGB.

The recommended pavement section assume regular maintenance (crack sealing, etc.) will occur, as needed. Note that if traffic volumes are greater than those assumed, CGC should be allowed to review the recommended pavement sections and adjust them accordingly. Alternative pavement designs may prove acceptable and should be reviewed by CGC. If there is a delay between subgrade preparation and placing the base course, the subgrade should be recompacted.

Where concrete pavement may be used, such as in pavement areas subjected to concentrated wheel loads (e.g., ramp or lower-level approaches, dumpster pads, etc.), we recommend that the concrete be at least 6 in. thick and contain adequate reinforcement for crack control. Concrete slabs underlain by a minimum 6-in. thick dense graded base layer over a firm or stabilized subgrade can be designed utilizing a subgrade modulus of 150 pci.

7. Stormwater Infiltration Potential

Test Pit 1 and Boring 1 were generally performed in the area of the proposed underground stormwater system. The subsurface profiles encountered in Test Pit 1 and Boring 1 generally consist of existing fill materials to a depth of about 2 ft, followed by lower-permeability soils, such as *clay loam*, *silty clay loam* and *silt loam*, extending to depths of about 5.5 to 9 ft below current site grades. The lower-permeability soils were underlain by granular soils, including *gravelly fine sand*, *loamy fine sand* and *sandy loam*, portions of which contained scattered *silt loam* seams. Further, auger refusal on probable bedrock was experienced at a depth of about 20 ft in Boring 1.

In our opinion, the subsurface conditions encountered in Test Pit 1 and Boring 1 appear suitable for infiltrating limited volumes of stormwater, based on the anticipated presence of granular soils with few scattered thin silt loam seams below depths of about 5.5 to 9 ft. However, deep-tilling / mixing of the granular soils, as discussed further herein, is recommended to break-up the less permeable silt loam seams present, as well as loosen the granular soils.

Infiltration Potential: The following is a summary of the estimated infiltration rates for the soils encountered in Test Pit 1 and Boring 1, per Table 2 of the WDNR Conservation Practice Standard 1002, *Site Evaluation for Storm Water Infiltration*. *Note that where lower-permeability soil (e.g., silt loam, silty clay loam, etc.) seams/layers exist within otherwise more permeable soils (e.g., granular, coarse-grained soils), the infiltration rate of the lower-permeability seams/layers will control the vertical infiltration rate, unless the lower-permeability seams are removed or the layer (with scattered seams) is excavated and blended, as discussed previously.* The estimated infiltration rates are as follows:

• Clay loam (CL)	0.03 in./hr
• Silty clay loam (SICL)	0.04 in./hr
• Silt loam (SIL)	0.13 in./hr
• Sandy loam (SL)	0.50 in./hr
• Gravelly sandy loam (GRSL)	0.50 in./hr
• Loamy fine sand (LFS)	0.50 in./hr
• Gravelly fine sand (GRFS)	0.50 in./hr
• Very gravelly sand (VGRS)	3.60 in./hr

Note that the infiltration rates should be considered very approximate since they are merely based on soil texture and do not account for in-place soil density and other factors, which will affect the infiltration rate. *Infiltration rates in fill should be considered especially approximate due to the potential for seams/layers of dissimilar material or variable composition. Therefore, consideration should be given to extending the bottom of the system below the anticipated fill materials into suitable native granular soils.* We recommend that the soils at and several feet below the

bottom of stormwater management system be checked by a certified soil tester *in conjunction with the basin designer* to document that the soils are appropriate for the design infiltration rate or recommend remedial measures, if necessary. *Variability in the soil conditions should be expected across the site, which could result in a wide range of undercut depths to reach soil suitable for the design infiltration rate.* The Wisconsin Department of Safety & Professional Services *Soil and Site Evaluation – Storm* form for Test Pit 1 and Boring 1 is contained in Appendix E.

Groundwater: Groundwater was not encountered in Test Pit 1 or Boring 1 during or upon the completion of excavating / drilling. Seasonal fluctuations of the groundwater table should be expected, as previously discussed.

Bedrock: Probable bedrock was encountered in Boring 1 below a depth of about 20 ft. Additionally, probable weathered bedrock was encountered in Borings 3 and 4, as well. The depth of bedrock should be expected to vary across the site.

During construction, appropriate erosion control should be provided to prevent eroded soil from contaminating the stormwater management areas. Where appropriate, the stormwater system design should include pretreatment to remove fine-grained soils (silt/clay) and clogging materials (oils/greases) from stormwater prior to entering the infiltration areas. Additionally, a regular maintenance plan should be developed to remove silt/clay soils and clogging materials that may accumulate in the bottom of the stormwater management areas over time. Failure to adequately control fine-grained soils and clogging materials from entering the infiltration areas or failure to regularly remove fine-grained soils and clogging materials that accumulate at the base of the stormwater infiltration systems will likely cause the stormwater management systems to fail. Additionally, it is important that the soils in the bottom of the infiltration systems do not become compacted during construction or measures are taken to mitigate soils that are compacted during construction. Refer to WDNR *Conservation Practice Standards 1002, 1003 and 1004*, as well as *NR151* for additional information.

CONSTRUCTION CONSIDERATIONS

Due to variations in weather, construction methods and other factors, specific construction problems are difficult to predict. Soil related difficulties which could be encountered on the site are discussed below:

- Due to the potentially sensitive nature of some of the on-site soils, we recommend that final site grading activities be completed during dry weather, if possible. Construction traffic should be avoided on prepared subgrades to minimize potential disturbance.

- Contingencies in the project budget for subgrade stabilization with coarse aggregate in pavement and floor slab areas should be increased if the project schedule requires that work proceed during adverse weather conditions.
- Earthwork construction during the late fall through early spring could be complicated as a result of wet weather and freezing temperatures. During cold weather, exposed subgrades should be protected from freezing before and after footing construction. Fill should never be placed while frozen or on frozen ground.
- Excavations extending greater than 4 ft in depth below the existing ground surface should be sloped or braced in accordance with current OSHA standards. Temporary earth retention/shoring could also be required for portions of the excavation, and shoring systems should be designed by an appropriately qualified professional engineer.
- Based on the observations made during our field exploration, we generally do not expect groundwater to be encountered during construction. However, water accumulating at the bottom of excavations as a result of precipitation or seepage should be quickly removed, with dewatering means and methods being the contractor's responsibility.

RECOMMENDED CONSTRUCTION MONITORING

The quality of the foundation, floor slab and pavement subgrades will be largely determined by the level of care exercised during site development. To check that earthwork and foundation construction proceed in accordance with our recommendations, the following operations should be monitored by CGC:

- Topsoil stripping and subgrade proof-rolling/compaction;
- Fill/backfill placement and compaction;
- Foundation excavation/subgrade preparation; and
- Concrete placement.

* * * * *



Geotechnical Exploration Report
ULGM Villager on Park
CGC Project No. C21476
October 4, 2021
Page 13

It has been a pleasure to serve you on this project. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.

A handwritten signature in blue ink, reading "Ryan J. Portman".

Ryan J. Portman, P.E., CST
Consulting Professional

A handwritten signature in black ink, reading "Alex J. Bina".

Alex J. Bina, P.E., CST
Consulting Professional

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring & Test Pit Location Exhibit
Logs of Test Borings (4)
Log of Test Pit (1)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications
Appendix D - Recommended Compaction Fill Specifications
Appendix E - WDSPS *Soil and Site Evaluation – Storm* Form
Particle Size Distribution Report

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

Subsurface conditions for this study were explored by drilling four Standard Penetration Test (SPT) soil borings that were sampled at 2.5-ft intervals to a depth of 15 ft, and at 5-ft intervals thereafter. The soil samples were obtained in general accordance with specifications for standard penetration testing, ASTM D 1586. The specific procedures used for drilling and sampling are described below.

1. Boring Procedures between Samples

The boring is extended downward, between samples, by a hollow-stem auger.

2. Standard Penetration Test and Split-Barrel Sampling of Soils
(ASTM Designation: D 1586)

This method consists of driving a 2-inch outside diameter split-barrel sampler using a 140-pound weight falling freely through a distance of 30 inches. The sampler is first seated 6 inches into the material to be sampled and then driven 12 inches. The number of blows required to drive the sampler the final 12 inches is recorded on the log of borings and is known as the Standard Penetration Resistance.

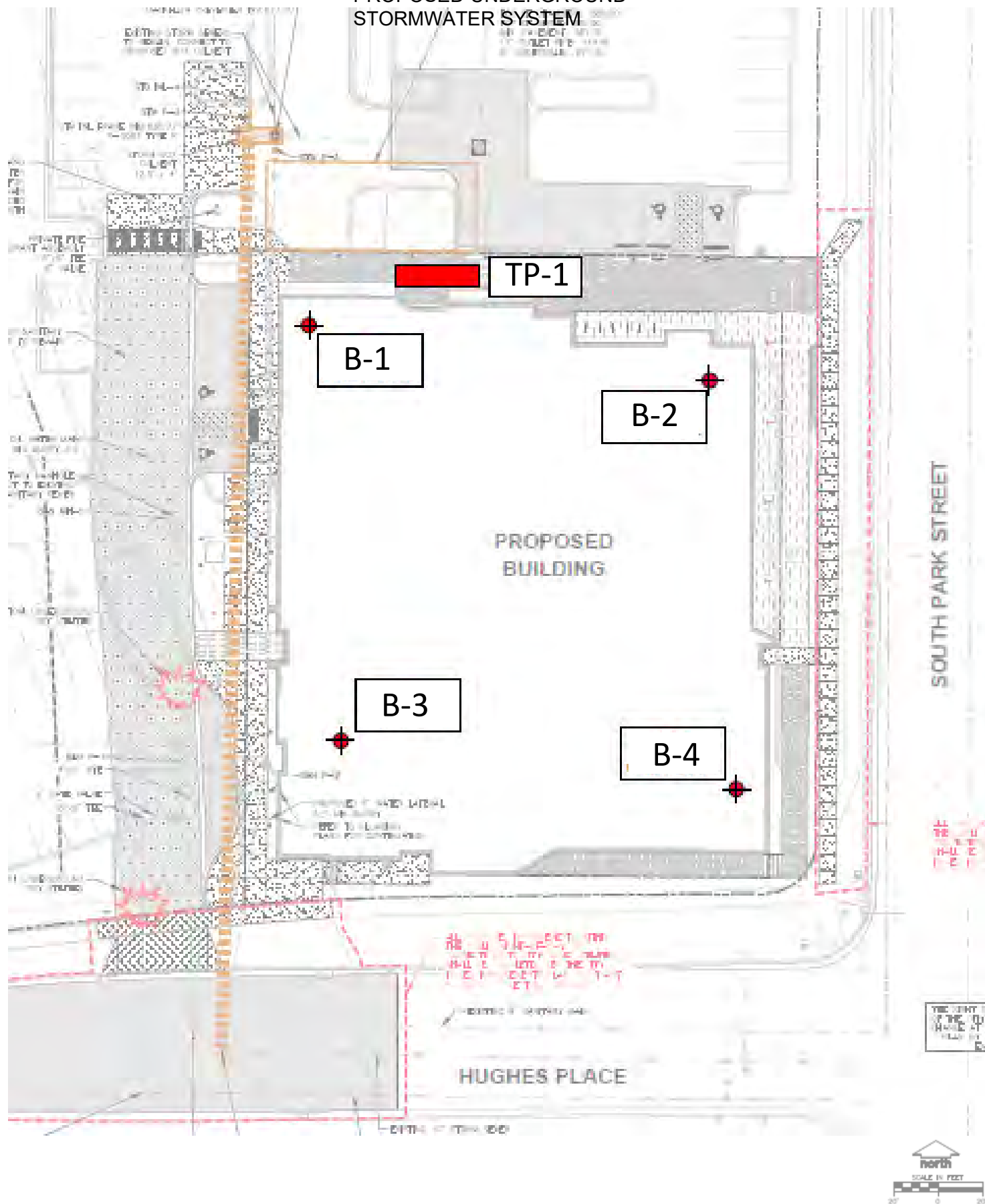
In addition to the soil borings, a test pit was performed on September 22, 2021 within the area of the proposed stormwater system by Hellenbrand Brothers Excavating personnel (under subcontract to CGC) and logged and sampled in the field by CGC. The test pit was extended to the planned depth of 10 ft below existing site grade.

During the field exploration, the driller visually classified the soil and prepared a field log. *Field screening of the soil samples for possible environmental contaminants was not conducted by the driller as these services were not part of CGC's work scope.* Water level observations were made in each boring during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the borings were backfilled with bentonite to satisfy WDNR regulations and the soil samples were delivered to our laboratory for visual classification. The soils were visually classified by a geotechnical engineer using the Unified Soil Classification System. The final logs prepared by the engineer, along with a Soil Boring Location Exhibit and a description of the Unified Soil Classification System are presented in Appendix B.

APPENDIX B

SOIL BORING & TEST PIT LOCATION EXHIBIT
LOGS OF TEST BORINGS (4)
LOG OF TEST PIT (1)
LOG OF TEST BORING-GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM

PROPOSED UNDERGROUND STORMWATER SYSTEM



Notes

1. Soil borings were performed by Badger State Drilling (under subcontract to CGC) on September 20, 2021.
2. Test pit was performed by Hellenbrand Brothers Excavating (under subcontract to CGC) on September 22, 2021
3. Base map was provided by JSD.

Job No.
C21476

Date:
9/30/21

CGC, Inc.

BORING & TEST PIT LOCATION EXHIBIT
ULGM Village on Park
2352 S. Park St., Madison, Wisconsin



LOG OF TEST BORING

Project ULGM Villager on Park
2352 South Park Street
Location Madison, WI

Boring No. **B-1**
Surface Elevation (ft) **881.5**
Job No. **C21476**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES					
No.	TYPE	Rec (in.)	Moist	N		Depth (ft)	qu (qa) (tsf)	W	LL	PL	LOI
						3± in. Asphalt/10± in. Base Course					
1		18	M	13		FILL: Brown Fine to Medium Sand, Little to Some Silt and Gravel	(1.0)	28.7			4.9
2		18	M	9		USDA: 10YR 5/4 Sandy Loam (Fill)	(2.5)				
					5	Medium Stiff, Dark Gray Lean CLAY, Trace Sand (CL)					
3		18	M	10		USDA: 10YR 4/2 Silty Clay Loam					
						Very Stiff, Brown (Mottled) Lean CLAY, Trace Sand (CL)					
4		18	M	4		USDA: 10YR 4/4 Silty Clay Loam					
					10	Redox: fld 10YR 4/6					
5		18	M	17		Very Loose to Medium Dense, Brown Fine to Medium SAND, Some Gravel, Trace Silt, Scattered Lenses of Dark Brown Silty Sand (SP)					
						USDA: 10YR 5/4 Gravelly Fine Sand, Scattered Sandy Loam					
6		18	M	16		Medium Dense, Tan Fine SAND, Some Silt, Scattered Silt Seams (SM/ML)					
					15	USDA: 10YR 6/3 Sandy Loam, Scattered Silt Loam Seams					
7		1	M	50/1"		(Very Dense; Poor Recovery)					
					20	End Boring/Auger Refusal on Probable Bedrock at 20 ft					
					25	Borehole backfilled with bentonite chips and asphalt patch					
					30						
					35						
					40						

WATER LEVEL OBSERVATIONS				GENERAL NOTES					
While Drilling	<input checked="" type="checkbox"/> NW	Upon Completion of Drilling	NW	Start	9/20/21	End	9/20/21		
Time After Drilling				Driller	BSD	Chief	MC	Rig	CME-55
Depth to Water				Logger	GB	Editor	RJP		
Depth to Cave in				Drill Method	2.25" HSA; Autohammer				
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.									



LOG OF TEST BORING

Project ULGM Villager on Park
2352 South Park Street
Location Madison, WI

Boring No. **B-2**
Surface Elevation (ft) **884.0**
Job No. **C21476**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES					
No.	TYPE	Rec (in.)	Moist	N		Depth (ft)	qu (qa) (tsf)	W	LL	PL	LOI
						4± in. Asphalt/9± in. Base Course					
1		18	M	24		FILL: Gray/Brown Fine to Medium Sand, Little to Some Silt and Gravel, Scattered Clay					
2		18	M	7		Medium Stiff to Stiff, Dark Gray/Brown Lean CLAY (CL)	(1.0-1.25)				
3		18	M	8		Stiff, Brown (Mottled) Lean CLAY, Trace Sand (CL)	(1.5-1.75)	25.0			
4		18	M	9		Loose, Brown Fine to Medium SAND, Some Gravel, Trace Silt, Scattered Lenses of Dark Brown Silty Sand (SP)					
5		18	M	5		Loose, Tan Laminated SILT and Fine SAND, Little Silt (ML/SP-SM)					
6		18	M	15		Medium Dense, Tan Fine SAND, Some Silt, Scattered Silt Seams (SM/ML)					
7		18	M	22							
8		18	M	25							
9		18	W	14		Medium Dense, Brown Clayey Fine to Medium SAND, Some Silt and Gravel, Scattered Green/Gray Silt and Clay Seams (SM - Probable Weathered Bedrock)					
						End Boring at 30 ft					
						Borehole backfilled with bentonite chips and asphalt patch					

WATER LEVEL OBSERVATIONS					GENERAL NOTES					
While Drilling	▽	28.5'	Upon Completion of Drilling	NW	Start	9/20/21	End	9/20/21		
Time After Drilling					Driller	BSD	Chief	MC	Rig	CME-55
Depth to Water					Logger	GB	Editor	RJP		
Depth to Cave in					Drill Method	2.25" HSA; Autohammer				
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.										




LOG OF TEST BORING

Project ULGM Villager on Park
2352 South Park Street
Location Madison, WI

Boring No. **B-4**
Surface Elevation (ft) **882.5**
Job No. **C21476**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE						VISUAL CLASSIFICATION and Remarks		SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)			qu (qa) (tsf)	W	LL	PL	LOI
							6± in. Mulch					
1		18	M	14			FILL: Brown Fine to Medium Sand, Little to Some Silt and Gravel					
2		18	M	19								
3		18	M	11				FILL: Brown Fine to Coarse Gravel, Some Sand, Trace Silt, Scattered Intermixed Clay (Pea Gravel)				
4		10	M	8								
5		8	M	4								
							Medium Stiff, Brown Sandy Lean CLAY, Trace Gravel (CL)	(0.75)				
6		18	M	4			Very Loose, Tan Fine SAND, Some Silt, Scattered Silt Seams (SM/ML)					
7		18	M	14			Medium Dense to Dense, Brown Fine to Medium SAND, Some Silt and Gravel, Scattered Green/Gray Silt and Clay Seams (SM - Probable Weathered Bedrock)					
8		12	M	38								
							End of Boring/Auger Refusal on Probable Bedrock at 25 ft					
							Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS					GENERAL NOTES				
While Drilling	<input checked="" type="checkbox"/>	NW	Upon Completion of Drilling	NW	Start	9/20/21	End	9/20/21	
Time After Drilling					Driller	BSD	Chief	MC	Rig CME-55
Depth to Water					Logger	GB	Editor	RJP	
Depth to Cave in					Drill Method	2.25" HSA; Autohammer			
The stratification lines represent the approximate boundary between soil types and the transition may be gradual.									



LOG OF TEST PIT

Project **ULGM Villager on Park**
2352 South Park Street
 Location **Madison, WI**

Pit No. **TP-1**
 Surface Elevation **882.5**
 Job No. **C21476**
 Sheet **1** of **1**

2921 PERRY STREET, MADISON, WIS. 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks		SOIL PROPERTIES					
No.	TYPE	Rec (in.)	Moist	N			Depth (ft)	qu (qa) (tsf)	W	LL	PL	Probe (in.)
						<div>17 in. TOPSOIL Fill USDA: 10YR 3/1 Silt Loam (Fill)</div>						
						<div>FILL: Tan Sandy Gravel (Base Course) USDA: 10YR 6/4 Very Gravelly Sand (Fill)</div>						
			M			<div>Black to Dark Gray Organic SILT (OL) USDA: GLEY1 N 2.5/ to 3/ Silt Loam (Organic Content (Near 3ft): 5.9%)</div>		24.7				
			M			<div>Gray to Green/Gray Lean CLAY (CL) USDA: GLEY1 5GY 4/1 Silty Clay Loam</div>						
			M			<div>Tan/Brown Sandy Lean CLAY, Interbedded Silty Sand Seams (CL) USDA: 10YR 5/3 Clay Loam</div>						
			M			<div>Tan/Brown Fine to Medium SAND, Some Silt, Trace Gravel, Scattered Silt Seams/Lenses (SM) [%P200= 12.2] USDA: 10YR 6/3; 5/4 Loamy Fine Sand, Scattered Silt Loam Seams</div>		12.0				
						End Test Pit at 10 ft						

WATER LEVEL OBSERVATIONS

GENERAL NOTES

While Excavating ☒ NW Upon Completion of Drilling ☒ NW
 Time After Excavating _____
 Depth to Water _____
 Depth to Cave in _____

Start **9/22/21** End **9/22/21**
 Driller **HBE** Chief **Rob**
 Logger **RJP** Editor **RJP**
 Equip. Used: **Takeuchi TB260**

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF TEST BORING

General Notes

DESCRIPTIVE SOIL CLASSIFICATION

Grain Size Terminology

Soil Fraction	Particle Size	U.S. Standard Sieve Size
Boulders	Larger than 12"	Larger than 12"
Cobbles	3" to 12"	3" to 12"
Gravel: Coarse.....	¾" to 3"	¾" to 3"
Fine	4.76 mm to ¾"	#4 to ¾"
Sand: Coarse.....	2.00 mm to 4.76 mm.....	#10 to #4
Medium	0.42 to mm to 2.00 mm	#40 to #10
Fine	0.074 mm to 0.42 mm.....	#200 to #40
Silt.....	0.005 mm to 0.074 mm.....	Smaller than #200
Clay.....	Smaller than 0.005 mm.....	Smaller than #200

Plasticity characteristics differentiate between silt and clay.

General Terminology

Physical Characteristics
Color, moisture, grain shape, fineness, etc.

Major Constituents
Clay, silt, sand, gravel

Structure
Laminated, varved, fibrous, stratified, cemented, fissured, etc.

Geologic Origin
Glacial, alluvial, eolian, residual, etc.

Relative Density

Term	"N" Value
Very Loose.....	0 - 4
Loose.....	4 - 10
Medium Dense.....	10 - 30
Dense.....	30 - 50
Very Dense.....	Over 50

Relative Proportions Of Cohesionless Soils

Proportional Term	Defining Range by Percentage of Weight
Trace.....	0% - 5%
Little	5% - 12%
Some.....	12% - 35%
And	35% - 50%

Consistency

Term	q _u -tons/sq. ft
Very Soft.....	0.0 to 0.25
Soft.....	0.25 to 0.50
Medium.....	0.50 to 1.0
Stiff.....	1.0 to 2.0
Very Stiff.....	2.0 to 4.0
Hard.....	Over 4.0

Organic Content by Combustion Method

Soil Description	Loss on Ignition
Non Organic.....	Less than 4%
Organic Silt/Clay.....	4 - 12%
Sedimentary Peat.....	12% - 50%
Fibrous and Woody Peat...	More than 50%

Plasticity

Term	Plastic Index
None to Slight.....	0 - 4
Slight.....	5 - 7
Medium.....	8 - 22
High to Very High ..	Over 22

The penetration resistance, N, is the summation of the number of blows required to effect two successive 6" penetrations of the 2" split-barrel sampler. The sampler is driven with a 140 lb. weight falling 30" and is seated to a depth of 6" before commencing the standard penetration test.

SYMBOLS

Drilling and Sampling

CS – Continuous Sampling
RC – Rock Coring: Size AW, BW, NW, 2"W
RQD – Rock Quality Designation
RB – Rock Bit/Roller Bit
FT – Fish Tail
DC – Drove Casing
C – Casing: Size 2 ½", NW, 4", HW
CW – Clear Water
DM – Drilling Mud
HSA – Hollow Stem Auger
FA – Flight Auger
HA – Hand Auger
COA – Clean-Out Auger
SS - 2" Dia. Split-Barrel Sample
2ST – 2" Dia. Thin-Walled Tube Sample
3ST – 3" Dia. Thin-Walled Tube Sample
PT – 3" Dia. Piston Tube Sample
AS – Auger Sample
WS – Wash Sample
PTS – Peat Sample
PS – Pitcher Sample
NR – No Recovery
S – Sounding
PMT – Borehole Pressuremeter Test
VS – Vane Shear Test
WPT – Water Pressure Test

Laboratory Tests

q_a – Penetrometer Reading, tons/sq ft
q_a – Unconfined Strength, tons/sq ft
W – Moisture Content, %
LL – Liquid Limit, %
PL – Plastic Limit, %
SL – Shrinkage Limit, %
LI – Loss on Ignition
D – Dry Unit Weight, lbs/cu ft
pH – Measure of Soil Alkalinity or Acidity
FS – Free Swell, %

Water Level Measurement

▽ - Water Level at Time Shown
NW – No Water Encountered
WD – While Drilling
BCR – Before Casing Removal
ACR – After Casing Removal
CW – Cave and Wet
CM – Caved and Moist

Note: Water level measurements shown on the boring logs represent conditions at the time indicated and may not reflect static levels, especially in cohesive soils.

CGC, Inc.









Madison - Milwaukee

Unified Soil Classification System

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART








COARSE-GRAINED SOILS

(more than 50% of material is larger than No. 200 sieve size)

GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size		Clean Gravels (Less than 5% fines)	
			GW Well-graded gravels, gravel-sand mixtures, little or no fines
			GP Poorly-graded gravels, gravel-sand mixtures, little or no fines
		Gravels with fines (More than 12% fines)	
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size			GM Silty gravels, gravel-sand-silt mixtures
			GC Clayey gravels, gravel-sand-clay mixtures
		Clean Sands (Less than 5% fines)	
			SW Well-graded sands, gravelly sands, little or no fines
			SP Poorly graded sands, gravelly sands, little or no fines
		Sands with fines (More than 12% fines)	
			SM Silty sands, sand-silt mixtures
			SC Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS

(50% or more of material is smaller than No. 200 sieve size.)

SILTS AND CLAYS Liquid limit less than 50%		ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater		MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH Inorganic clays of high plasticity, fat clays
		OH Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		PT Peat and other highly organic soils

LABORATORY CLASSIFICATION CRITERIA

GW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3

GP Not meeting all gradation requirements for GW

GM	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
GC	Atterberg limits above "A" line or P.I. greater than 7	

SW $C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{D_{30}}{D_{10} \times D_{60}}$ between 1 and 3

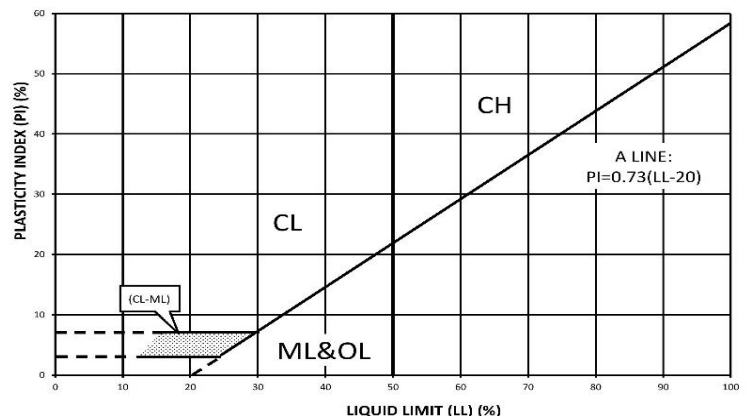
SP Not meeting all gradation requirements for GW

SM	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in shaded zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
SC	Atterberg limits above "A" line with P.I. greater than 7	

Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

Less than 5 percent GW, GP, SW, SP
More than 12 percent GM, GC, SM, SC
5 to 12 percent Borderline cases requiring dual symbols

PLASTICITY CHART



APPENDIX C

DOCUMENT QUALIFICATIONS

APPENDIX C

DOCUMENT QUALIFICATIONS

I. GENERAL RECOMMENDATIONS/LIMITATIONS

CGC, Inc. should be provided the opportunity for a general review of the final design and specifications to confirm that earthwork and foundation requirements have been properly interpreted in the design and specifications. CGC should be retained to provide soil engineering services during excavation and subgrade preparation. This will allow us to observe that construction proceeds in compliance with the design concepts, specifications and recommendations, and also will allow design changes to be made in the event that subsurface conditions differ from those anticipated prior to the start of construction. CGC does not assume responsibility for compliance with the recommendations in this report unless we are retained to provide construction testing and observation services.

This report has been prepared in accordance with generally accepted soil and foundation engineering practices and no other warranties are expressed or implied. The opinions and recommendations submitted in this report are based on interpretation of the subsurface information revealed by the test borings indicated on the location plan. The report does not reflect potential variations in subsurface conditions between or beyond these borings. Therefore, variations in soil conditions can be expected between the boring locations and fluctuations of groundwater levels may occur with time. The nature and extent of the variations may not become evident until construction.

II. IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes. While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one - not even you* - should apply the report for any purpose or project except the one originally contemplated.

READ THE FULL REPORT

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes - even minor ones - and request an assessment of their impact. *CGC cannot accept responsibility or liability for problems that occur because our reports do not consider developments of which we were not informed.*

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL OPINION

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgement to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ - sometimes significantly - from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most

effective method of managing the risks associated with unanticipated conditions.

A REPORT'S RECOMMENDATIONS ARE NOT FINAL

Do not over-rely on the confirmation-dependent recommendations included in your report. *Those confirmation-dependent recommendations are not final*, because geotechnical engineers develop them principally from judgement and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *CGC cannot assume responsibility or liability for the report's confirmation-dependent recommendations if we do not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical engineering report. Confront that risk by having CGC participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

DO NOT REDRAW THE ENGINEER'S LOGS

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

GIVE CONSTRUCTORS A COMPLETE REPORT AND GUIDANCE

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

READ RESPONSIBILITY PROVISIONS CLOSELY

Some clients, design professionals, and constructors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic

expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineer's responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

ENVIRONMENTAL CONCERNS ARE NOT COVERED

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

OBTAIN PROFESSIONAL ASSISTANCE TO DEAL WITH MOLD

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention.* *Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

RELY ON YOUR GEOTECHNICAL ENGINEER FOR ADDITIONAL ASSISTANCE

Membership in the Geotechnical Business Council (GBC) of Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with CGC, a member of GBC, for more information.

Modified and reprinted with permission from:

Geotechnical Business Council
of the Geoprofessional Business Association
8811 Colesville Road, Suite G 106
Silver Spring, MD 20910

APPENDIX D

RECOMMENDED COMPACTED FILL SPECIFICATIONS

APPENDIX D

CGC, INC.

RECOMMENDED COMPACTED FILL SPECIFICATIONS

General Fill Materials

Proposed fill shall contain no vegetation, roots, topsoil, peat, ash, wood or any other non-soil material which by decomposition might cause settlement. Also, fill shall never be placed while frozen or on frozen surfaces. Rock, stone or broken concrete greater than 6 in. in the largest dimension shall not be placed within 10 ft of the building area. Fill used greater than 10 ft beyond the building limits shall not contain rock, boulders or concrete pieces greater than a 2 sq ft area and shall not be placed within the final 2 ft of finish subgrade or in designated utility construction areas. Fill containing rock, boulders or concrete pieces should include sufficient finer material to fill voids among the larger fragments.

Special Fill Materials

In certain cases, special fill materials may be required for specific purposes, such as stabilizing subgrades, backfilling undercut excavations or filling behind retaining walls. For reference, WisDOT gradation specifications for various types of granular fill are attached in Table 1.

Placement Method

The approved fill shall be placed, spread and leveled in layers generally not exceeding 10 in. in thickness before compaction. The fill shall be placed at moisture content capable of achieving the desired compaction level. For clay soils or granular soils containing an appreciable amount of cohesive fines, moisture conditioning will likely be required.

It is the Contractor's responsibility to provide all necessary compaction equipment and other grading equipment that may be required to attain the specified compaction. Hand-guided vibratory or tamping compactors will be required whenever fill is placed adjacent to walls, footings, columns or in confined areas.

Compaction Specifications

Maximum dry density and optimum moisture content of the fill soil shall be determined in accordance with modified Proctor methods (ASTM D1557). The recommended field compaction as a percentage of the maximum dry density is shown in Table 2. Note that these compaction guidelines would generally not apply to coarse gravel/stone fill. Instead, a method specification would apply (e.g., compact in thin lifts with a vibratory compactor until no further consolidation is evident).

Testing Procedures

Representative samples of proposed fill shall be submitted to CGC, Inc. for optimum moisture-maximum density determination (ASTM D1557) prior to the start of fill placement. The sample size should be approximately 50 lb.

CGC, Inc. shall be retained to perform field density tests to determine the level of compaction being achieved in the fill. The tests shall generally be conducted on each lift at the beginning of fill placement and at a frequency mutually agreed upon by the project team for the remainder of the project.

Table 1
Gradation of Special Fill Materials

Material	WisDOT Section 311	WisDOT Section 312	WisDOT Section 305			WisDOT Section 209		WisDOT Section 210
	Breaker Run	Select Crushed Material	3-in. Dense Graded Base	1 1/4-in. Dense Graded Base	3/4-in. Dense Graded Base	Grade 1 Granular Backfill	Grade 2 Granular Backfill	Structure Backfill
Sieve Size	Percent Passing by Weight							
6 in.	100							
5 in.		90-100						
3 in.			90-100					100
1 1/2 in.		20-50	60-85					
1 1/4 in.				95-100				
1 in.					100			
3/4 in.			40-65	70-93	95-100			
3/8 in.				42-80	50-90			
No. 4			15-40	25-63	35-70	100 (2)	100 (2)	25-100
No. 10		0-10	10-30	16-48	15-55			
No. 40			5-20	8-28	10-35	75 (2)		
No. 100						15 (2)	30 (2)	
No. 200			2-12	2-12	5-15	8 (2)	15 (2)	15 (2)

Notes:

1. Reference: Wisconsin Department of Transportation *Standard Specifications for Highway and Structure Construction*.
2. Percentage applies to the material passing the No. 4 sieve, not the entire sample.
3. Per WisDOT specifications, both breaker run and select crushed material can include concrete that is 'substantially free of steel, building materials and other deleterious material'.

Table 2
Compaction Guidelines

Area	Percent Compaction (1)	
	Clay/Silt	Sand/Gravel
<u>Within 10 ft of building lines</u>		
Footing bearing soils	93 - 95	95
Under floors, steps and walks		
- Lightly loaded floor slab	90	90
- Heavily loaded floor slab and thicker fill zones	92	95
<u>Beyond 10 ft of building lines</u>		
Under walks and pavements		
- Less than 2 ft below subgrade	92	95
- Greater than 2 ft below subgrade	90	90
Landscaping	85	90

Notes:

1. Based on Modified Proctor Dry Density (ASTM D 1557)

APPENDIX E

**WISCONSIN DEPARTMENT OF SAFETY & PROFESSIONAL SERVICES
SOIL AND SITE EVALUATION – STORM FORM
PARTICLE SIZE DISTRIBUTION REPORT**

**Attachment 2:****SOIL AND SITE EVALUATION - STORM**

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

1002-CPS-23
Division of Industry Services
P.O. Box 2658
Madison, Wisconsin 53701
Scott Walker, Governor
Laura Gutierrez, Secretary
Page 1 of 1

Attach a complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road Please print all information Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	County Dane
	Parcel I.D. 251/0709-352-0406-9
	Reviewed by: Date:

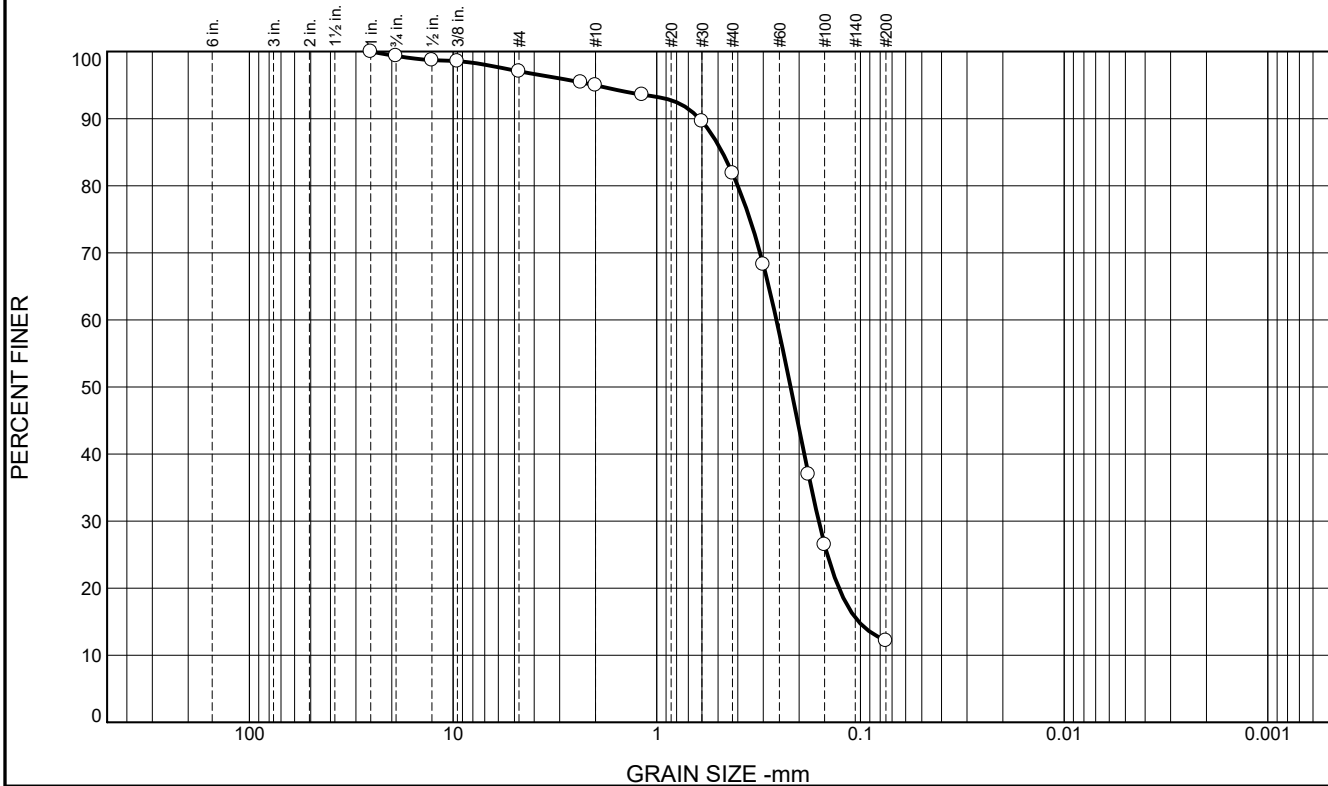
Property Owner City of Madison CDA	Property Location Govt. Lot SE 1/4 NW 1/4 S 35 T 7 N R 9 E
Property Owner's Mail Address P.O. Box 2983	Lot # 2 Block# Subd. Name or CSM # CSM 13468
City Madison State WI Zip Code 53701-2983 Phone Number	<input checked="" type="checkbox"/> City <input type="checkbox"/> Village <input type="checkbox"/> Town Madison Nearest Road 2300 S Park Street
Drainage area <input type="checkbox"/> sq ft <input type="checkbox"/> acres Test site suitable for (check all that apply): <input type="checkbox"/> Bioretention; <input type="checkbox"/> Subsurface Dispersal System; <input type="checkbox"/> Reuse; <input type="checkbox"/> Irrigation; <input type="checkbox"/> Other	Hydraulic Application Test Method <input checked="" type="checkbox"/> Morphological Evaluation <input type="checkbox"/> Double Ring Infiltrometer <input type="checkbox"/> Other: (specify) Soil Moisture Date of soil borings: 9/22/2021 USDA-NRCS WETS Value: <input type="checkbox"/> Dry = 1; <input checked="" type="checkbox"/> Normal = 2; <input type="checkbox"/> Wet = 3.

TP-1	#OBS. <input checked="" type="checkbox"/> Pit <input type="checkbox"/> Boring	Ground surface elevation 882.5 ft.	Elevation of limiting factor < 872.5 ft.							
Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% P200	Hydraulic App Rate Inches/Hr
1	0-17	10YR 3/1	None	SIL (Fill)	Varies	Varies	gw	< 5		0.13 ⁽¹⁾
2	17-25	10YR 6/4	None	VGRS (Fill)	0sg	ml	gw	45-55		3.6 ⁽¹⁾
3	25-62	GLE Y1 N 2.5/; 3/	None	SIL	2mabk	mvfi	gw	< 5		0.13
4	62-86	GLE Y1 5GY 4/1	None	SICL	1fsbk	mvfi	gw	< 5		0.04
5	86-108	10YR 5/3	None	CL	1fsbk	mfi	gw	< 5		0.03
6	108-120	10YR 6/3; 5/4	None	LFS/SIL	0sg	ml		< 5	12.2	0.5 ⁽²⁾
Comments: No apparent groundwater encountered within excavation. Gley coloration in Horizons 3 and 4 likely attributable to restrictive permeability of layers. ⁽¹⁾ Infiltration rate within fill materials may be highly variable. ⁽²⁾ Deep-tilling or mixing of horizon will be necessary to break up scattered <i>silt loam</i> seams/lenses, which would otherwise limit the infiltration of this horizon.										

B-1	#OBS. <input type="checkbox"/> Pit <input checked="" type="checkbox"/> Boring	Ground surface elevation 881.5 ft.	Elevation of limiting factor 861.5 ft. (Bedrock)							
Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% P200	Hydraulic App Rate Inches/Hr
1	0-13	Pavement Section								
2	13-24	10YR 5/4	None	SL (Fill)	0sg	ml	gw	5-15		0.5 ⁽¹⁾
3	24-48	10YR 4/2	None	SICL	1fsbk	mvfi	gw	< 5		0.04
4	48-66	10YR 4/4	f1d 10YR 4/6	SICL	1fsbk	mvfi	gw	< 5		0.04
5	66-126	10YR 5/4	None	GRFS/SL	0sg	ml	gw	15-25		0.5
6	126-240	10YR 6/3	None	SL/SIL	0sg	ml	cs	< 5		0.5 ⁽²⁾
7	≥ 240			BR						
Comments: Bedrock encountered at about 20 ft. No apparent groundwater encountered within excavation. Apparent mottling/reodox noted in Horizon 4 likely attributable to restrictive permeability of layer. ⁽¹⁾ Infiltration rate within fill materials may be highly variable. ⁽²⁾ Deep-tilling or mixing of horizon will be necessary to break up scattered <i>silt loam</i> seams/lenses, which would otherwise limit the infiltration of this horizon.										

Name (Please Print) Ryan J. Portman	Signature 	Credential Number 1201636
Address 201 N. Mallard Dr., Sun Prairie, WI 53590	Date Evaluation Conducted 9/22/2021	Telephone Number 608-288-4100

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.7	2.2	2.1	13.2	69.6	12.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	99.3		
1/2	98.7		
3/8	98.6		
#4	97.1		
#8	95.4		
#10	95.0		
#16	93.6		
#30	89.6		
#40	81.8		
#50	68.3		
#80	37.0		
#100	26.5		
#200	12.2		

* (no specification provided)

Material Description
Brown Fine to Medium Sand, Some Silt, Trace Gravel

Atterberg Limits
 PL= LL= PI=

Coefficients
 D₉₀= 0.6167 D₈₅= 0.4769 D₆₀= 0.2584
 D₅₀= 0.2202 D₃₀= 0.1603 D₁₅= 0.1021
 D₁₀= C_u= C_c=

Classification
 USCS= SM AASHTO=

Remarks

Sample Number: TP-1 Depth: 9'

Date: 9/30/21



Client: Urban League of Greater Madison
 Project: ULGM Villager on Park

Project No: C21476

Figure

Tested By: DRW Checked By: RJP

From: [Mike Schultz](#)
To: ["Kevin Yeska"](#); ["Whitney, James"](#)
Cc: ["Gall, Matt"](#); [Windorski, Dan](#); ["Matt Saunders"](#)
Subject: RE: villager supplemental soil boring map and locations C22370
Date: Wednesday, September 14, 2022 3:26:08 PM
Attachments: [image002.png](#)
[image004.png](#)
[image005.png](#)
[image006.png](#)
[image007.png](#)
[The Village on Park Supplemental Borings.pdf](#)

Attached please find the borings we completed recently for the supplemental drilling program associated with the Village on the Park project. The borings we performed are circled in black as shown on the enclosed map. Three supplemental borings were done for the proposed ramp (SB-1, 2 and 3), one boring was done for pavement (PB-1) and two borings were done associated with infiltration (IB-1 and 2). The associated DSPS Storm form is also included related to IB-1 and 2. Note that the proposed test pit has not been excavated yet as that will take coordination and assistance from TriNorth.

The intent of this supplemental program was to develop additional subsurface information to enhance prior data presented in our Report C21192 dated May 28, 2021.

The soil profiles exhibited for this study pertaining to SB-1, 2 and 3 are very similar to Borings 1 and 2 done previously in the proposed ramp area. We continue to be of the opinion that a mass undercut to expose medium dense sands should be considered prior to foundation construction. Anticipated undercut depths are as follows:

- Boring 1: 6 ft
- Boring 2: 13 ft
- Boring SB-1: 8.5 ft
- Boring SB-2: 13.5 ft
- Boring SB-3: 13.5 ft

Following excavation and soil subgrade approval by CGC staff, the exposed medium dense sand subgrades should be recompacted by a vibratory roller until deflection ceases. Loose areas that do not improve with repeated compaction will require additional soil removal to greater depths. If dewatering is needed during the excavation process, means and methods are the contractor's responsibility to control water to allow for proper compaction. Subsequent backfill should be granular backfill placed as described in our initial report that is densified to at least 95% compaction based on modified Proctor methods (ASTM D-1557). Provided this is accomplished we recommend that footings be sized for a maximum design soil bearing pressure of 5000psf.

As a potential alternative stone columns/rammed aggregate piers could be used to develop adequate soil bearing conditions. There are multiple contractors in the Madison market that could develop a design and associated costs. Possibly a greater design soil bearing pressure could be implemented but that would be incorporated into their proprietary design.

We trust this submittal addresses your present needs. Please contact CHC if you have questions upon review and forward to others as needed. Thank you.

Michael N. Schultz, P.E.
President - CGC, Inc.
2921 Perry St.
Madison, WI 53713
Phone: 608-288-4100
Fax: 608-288-7887

Cell: 608-712-0571

Web Site: www.cgcinc.net



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From: Kevin Yeska [mailto:Kevin.Yeska@jsdinc.com]

Sent: Wednesday, September 07, 2022 6:24 PM

To: Whitney, James <JWhitney@cityofmadison.com>; 'Mike Schultz' <mschultz@cgcinc.net>

Cc: Gall, Matt <MGall@cityofmadison.com>; Dan Windorski (dan.windorski@graef-usa.com) <dan.windorski@graef-usa.com>; Matt Saunders <matt.saunders@jsdinc.com>

Subject: RE: villager soil boring map and ULO map

Mike/Jim,

Can you please provide me with an exhibit of the borings and test pits done to date? Then we can evaluate whether or not another is needed north of the Urban League building.



Planners · Engineers · Landscape Architects · Surveyors

Kevin Yeska | Project Consultant & Landscape Architect, PLA, ASLA | kevin.yeska@jsdinc.com

Madison Regional Office – 161 Horizon Dr., Suite 101, Verona, WI 53593

P:608.848.5060 C: 608.609.6794 | www.jsdinc.com



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From: Whitney, James <JWhitney@cityofmadison.com>

Sent: Wednesday, September 07, 2022 2:58 PM

To: 'Mike Schultz' <mschultz@cgcinc.net>

Cc: Gall, Matt <MGall@cityofmadison.com>; Kevin Yeska <Kevin.Yeska@jsdinc.com>; Dan Windorski (dan.windorski@graef-usa.com) <dan.windorski@graef-usa.com>

Subject: RE: villager soil boring map and ULO map

Ok thanks Mike, We will go with the borings that you have already made. Not sure if we will need more borings yet. If we do it might be for an underground storm system location that would be moving to the parking lot area just north of the new Urban League building, but need to check on that first with JSD. Jim

From: Mike Schultz <mschultz@cgcinc.net>

Sent: Wednesday, September 7, 2022 2:36 PM

To: Whitney, James <JWhitney@cityofmadison.com>

Subject: RE: villager soil boring map and ULO map

Caution: This email was sent from an external source. Avoid unknown links and attachments.

Jim – We recently completed the borings based on the last revision. I will need to review this rendering, determine what has changed and then return to the site at your direction to drill at any new locations. A quick gleaning of this new plan shows that the infiltration boring near the SW lot corner has been eliminated but we already drilled it.

Michael N. Schultz, P.E.
President - CGC, Inc.
2921 Perry St.
Madison, WI 53713
Phone: 608-288-4100
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From: Whitney, James [<mailto:JWhitney@cityofmadison.com>]

Sent: Wednesday, September 07, 2022 1:55 PM

To: 'Dan Beml' <DBeml@greatlakespowervac.com>; Erika Cleaver <ecleaver@tri-north.com>; Toma Goodbear <tgoodbear@tri-north.com>; 'Jamah Johnson' <jjohnson@f3maintenance.com>; Kevin Yeska <Kevin.Yeska@jsdinc.com>; Gall, Matt <MGall@cityofmadison.com>; Dan Windorski (dan.windorski@graef-usa.com) <dan.windorski@graef-usa.com>; 'Mike Schultz' <mschultz@cgcinc.net>; Koval, Kristine <KKoval@cityofmadison.com>

Subject: villager soil boring map and ULO map

Attached maps for your reference.

Mike Schultz, We have another revision to the soil boring map.

Dan Beml, MG&E is doing some work next week on new electrical service for the UL Hub building on the corner. The week of Sept. 19th or later during the week of Sept. 26th would be best for your pot-holing work. We need to coordinate a date so that Tri-North and Kevin at JSD can be there at the same time.

Thanks, Jim

(608) 266-4563

LOT 1 AND 2 OF CERTIFIED SURVEY MAP NO. 13468 RECORDED IN THE OFFICE OF THE REGISTER OF DEEDS, IN VOLUME 87 OF CERTIFIED SURVEY MAPS, PAGES 296 - 301 AS DOCUMENT NO. 4964825, AND LOT OF CERTIFIED SURVEY MAP NO. 12750 RECORDED IN THE OFFICE OF THE REGISTER OF DEEDS, IN VOLUME 81 OF CERTIFIED SURVEY MAPS, PAGES 55-63 AS DOCUMENT NO. 4405498, LOCATED IN THE SOUTH-EAST 1/4 AND OF THE NORTHWEST 1/4 OF SECTION 35, TOWNSHIP 07 NORTH, RANGE 09 EAST, IN THE CITY OF MADISON, DANE COUNTY, WISCONSIN.



FEATURES
PK Nail
1 1/2" Nylon Cap # 11578
(Unless Otherwise Noted)
RCW Marker
Control Point
Bench Mark
Flatted Distance
Measured Bearing & Distance
Recorded As
Dead Distance
Computed Distance
Minimum Protection Elevation
Centerline
Section Line
1/4 Section Line
1/4 1/4 Section Line
Easement Line

FOUND
▲
●
■
□
●
P
M
R
D
C
MBPE

FEATURES
Spot Elevation
Curbless Elevation
Fence (Barbed, Field, Hog)
Fence (Chain Link)
Fence (Wood)
Fence (Wire)
Tree Limb
Tree Stump

Deciduous Tree 1/2 Shrub

Coniferous Tree 1/2 Shrub

Communication
Fiber Optic
Underground Electric
Overhead Electric
Gas Main with Size
High Pressure Gas Main with Size
Water Main with Size
Sanitary Sewer with Size
Dust Bank
Test Hole Location for SUE with

EXISTING

Sanitary Manhole
Storm Sewer with Size
Storm Manhole
Single Storm Sewer Intake
Double Storm Sewer Intake
Fire Hydrant
Fire Hydrant on Building
Water Main Valve
Water Service Valve
Well
Utility Pole
Guy Anchor
Utility Pole with Light
Utility Pole with Transformer
Street Light
Yard Light
Electric Box
Electric Transformer
Traffic Sign

- Communication Pedestal
- Communication Manhole
- Communication Handhole
- Fiber Optic Manhole
- Fiber Optic Handhole
- Gas Valve
- Gas Manhole
- Gas Apparatus
- Fence Post or Guard Post
- Underground Storage Tank
- Above Ground Storage Tank
- Sign
- Satellite Dish
- Mailbox
- Sprinkler Head
- Irrigation Control Valve
- Soil Boring

Top of Root Elevation
Finished Floor Elevation



- APPROXIMATE LOCATION OF 2021 BORINGS
- APPROXIMATE LOCATION OF 2021 TEST PIT
- LOCATION OF NEW BORING
- LOCATION OF NEW TEST PIT

LOG OF TEST BORING


Project **The Village on Park**
Park Street and Hughes Place
 Location **Madison, WI**

Boring No. **SB-1**
Surface Elevation (ft) **882±**
Job No. **C22370**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Rec (in.)	Moist	N	Depth (ft)		q _u (qa) (tsf)	W	LL	PL	LOI
					6 in. ASPHALT and 11 in. BASE COURSE					
1	10	M	12		Medium Dense, Dark Brown SILT, Trace Sand, Some Gravel (ML/Possible Fill)					
2	12	M	4		Loose to Medium Dense, Brown Fine to Medium SAND, Some Silt and Gravel (SM/Possible Fill to 8 ft)					
3	14	M	5							
4	12	M	23							
5	14	M	20		Medium Dense, White Fine SAND, Trace Silt and Gravel (SP; Probable Weathered Sandstone Bedrock)					
7	16	M	42		Dense to Very Dense, Tan Fine to Coarse SAND, Some Silt, Trace Gravel (SM; Probable Weathered Sandstone Bedrock)					
8	4	M/W	50/4"							
					End of Boring/Auger Refusal at 26 ft					
					Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Drilling  <u>NW</u>	Upon Completion of Drilling <u>NW</u>			
Time After Drilling				
Depth to Water				
Depth to Cave in				

GENERAL NOTES

Start	8/22/22	End	8/22/22	
Driller	PTS	Chief		Rig
Logger		Editor	ELC	
Drill Method	2.25" HSA; Autohammer			

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



LOG OF TEST BORING

Project The Village on Park
Park Street and Hughes Place
Location Madison, WI

Boring No. **SB-2**
Surface Elevation (ft) **881.5±**
Job No. **C22370**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Field	Rec (in.)	Moist	N		qu (qa) (tsf)	W	LL	PL	LOI
					7 in. ASPHALT and 12 in. BASE COURSE					
1		6	M	10	FILL: Intermixed Clayey Sand to Sandy Clay					
2		17	M	5						
3		18	M	4	Very Stiff, Brown Sandy Lean CLAY (CL)	(2.25)				
4		18	M	8	Loose, Tan Laminated SILT and Fine SAND, Little Clay (ML/SM)					
5		16	M	16	Medium Dense, Brown Fine SAND, Some Silt, Trace Gravel, Interbedded Silt Seams (SM)					
6		18	M	20	Medium Dense Tan Fine SAND, Some Silt and Gravel (SM; Probable Weathered Sandstone Bedrock)					
7		18	M	26						
8		18	M	8	Stiff, Dark Brown Lean CLAY, Trace Sand and Gravel (CL; Probable Highly Weathered Sandstone Bedrock)	(1.5-1.75)				
					End of Boring at 30 ft					
					Backfilled with Bentonite Chips					

WATER LEVEL OBSERVATIONS

GENERAL NOTES

While Drilling ☒ NW Upon Completion of Drilling ☐ NW
Time After Drilling _____
Depth to Water _____
Depth to Cave in _____

Start 8/22/22 End 8/22/22
Driller PTS Chief _____ Rig _____
Logger _____ Editor ELC
Drill Method 2.25" HSA; Autohammer

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.



LOG OF TEST BORING

Project The Village on Park
Park Street and Hughes Place
 Location Madison, WI

Boring No. **SB-3**
 Surface Elevation (ft) 881.5±
 Job No. C22370
 Sheet 1 of 1

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

SAMPLE					VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	Rec (in.)	Moist	N	Depth (ft)		q _u (qa) (tsf)	W	LL	PL	LOI
					7 in. ASPHALT and 10 in. BASE COURSE					
1	16	M	5		FILL: Loose, Brown Fine to Medium Sand, Trace Clay, Some Silt, Trace Gravel					
2	16	M	4		Very Stiff, Brown Mottled Lean CLAY, Trace Sand and Gravel (CL)	(2.25-2.5)				
3	18	M	5		Loose, Tan Laminated SILT and Fine SAND, Little Clay (ML/SM)					
4	18	M	6							
				10						
5	18	M	14		Medium Dense, Tan Fine SAND, Some Silt, Trace Gravel, Interbedded Silt Seams (SM)					
				15						
6	18	M/W	6		Loose to Dense, Brown Fine to Medium SAND, Some Silt, Trace to Some Gravel (SM; Probable Weathered Sandstone Bedrock)					
				20						
7	18	M	25							
				25						
8	14	M	41							
				30	End of Boring at 30 ft					
					Backfilled with Bentonite Chips					
				35						

WATER LEVEL OBSERVATIONS

GENERAL NOTES

While Drilling ☒ NW Upon Completion of Drilling NW
 Time After Drilling _____
 Depth to Water _____
 Depth to Cave in _____

Start 8/22/22 End 8/22/22
 Driller PTS Chief _____ Rig _____
 Logger _____ Editor ELC
 Drill Method 2.25" HSA; Autohammer

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF TEST BORING

Project **The Village on Park**
Park Street and Hughes Place
 Location **Madison, WI**

Boring No. **IB-1**
Surface Elevation (ft) **883±**
Job No. **C22370**
Sheet **1** of **1**

2921 Perry Street, Madison, WI 53713 (608) 288-4100, FAX (608) 288-7887

[illegible]

[illegible]

**Attachment 2:****SOIL AND SITE EVALUATION - STORM**

In accordance with SPS 382.365, 385, Wis. Adm. Code, and WDNR Standard 1002

1002-CPS-23
Division of Industry Services
P.O. Box 2658
Madison, Wisconsin 53701
Scott Walker, Governor
Laura Gutierrez, Secretary
Page 1 of 1

Attach a complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road Please print all information Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]	County	Dane
	Parcel I.D.	251/0709-352-0406-9
	Reviewed by: Date:	

Property Owner CITY OF MADISON CDA	Property Location Govt. Lot 1/4 1/4 S 35 T 7 N R 8 E		
Property Owner's Mail Address PO BOX 2983	Lot #	Block#	Subd. Name or CSM # CSM# 15938
City State Zip Code Phone Number MADISON WI 53701-2983	<input checked="" type="checkbox"/> City <input type="checkbox"/> Village <input type="checkbox"/> Town MADISON		Nearest Road 2300 S. PARK ST
Drainage area _____ sq ft _____ acres Test site suitable for (check all that apply): <input type="checkbox"/> Bioretention; <input type="checkbox"/> Subsurface Dispersal System; <input type="checkbox"/> Reuse; <input type="checkbox"/> Irrigation; <input type="checkbox"/> Other _____	Hydraulic Application Test Method <input checked="" type="checkbox"/> Morphological Evaluation <input type="checkbox"/> Double Ring Infiltrometer <input type="checkbox"/> Other: (specify) _____		Soil Moisture Date of soil borings: _____ USDA-NRCS WETS Value: <input type="checkbox"/> Dry = 1; <input type="checkbox"/> Normal = 2; <input type="checkbox"/> Wet = 3.

IB-1 #OBS. <input type="checkbox"/> Pit <input checked="" type="checkbox"/> Boring Ground surface elevation 883 ft. Elevation of limiting factor < 868 ft.										
Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frgs.	% Fines	Hydraulic App Rate Inches/Hr
1	0-14.5	Existing Pavement Section (4.5" of Asphalt over 10" of Base Course)								
2	14.5-42	10YR 2/1; 4/2	None	SIL	1fsbk	mfi	gw	< 5		0.13
3	42-66	10YR 4/4	None	SICL	1fsbk	mfi	gw	< 5		0.04
4	66-102	10YR 5/2	c2d 10YR 5/6	SICL	1fsbk	mfi	gw	< 5		0.04
5	102-180	10YR 6/4; 6/3	None	FS	0sg	ml		< 5		0.5
Comments: No groundwater encountered during or upon completion of drilling. Mottling/reodox observed in Horizon 4 appears to be attributable to the restrictive permeability of stratum and not due to seasonal high groundwater fluctuations.										

IB-2 #OBS. <input type="checkbox"/> Pit <input checked="" type="checkbox"/> Boring Ground surface elevation 886 ft. Elevation of limiting factor 880 ft. (Bedrock)										
Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frgs.	% Fines	Hydraulic App Rate Inches/Hr
1	0-16	Existing Pavement Section (6" of Asphalt over 10" of Base Course)								
2	16-42	10YR 3/2	None	GRCL (Fill)	Varies	Varies	gw	15-25		0.03
3	42-72	10YR 4/4	None	SICL	1fsbk	mfi	gw	< 5		0.04
4	72-156	10YR 8/1; 7/2	None	BR						
5	156-180	7.5YR 7/4	None	BR						
Comments: No groundwater encountered during or upon completion of drilling. Possible weathered sandstone bedrock encountered below about 6 ft. with potentially more competent sandstone with depth (based on elevated N-values with depth).										

Name (Please Print) Ryan J. Portman	Signature	Credential Number 1201636
Address 201 N. Mallard Dr., Sun Prairie, WI 53590	Date Evaluation Conducted 9/12/2022	Telephone Number 608-288-4100

SECTION 024100 DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Selective demolition of built site elements.
- B. Selective demolition of building elements for alteration purposes.
- C. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

- A. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- B. Section 015713 - Temporary Erosion and Sediment Control.
- C. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- D. Section 312323 - Fill: Filling holes, pits, and excavations generated as a result of removal operations.

PART 3 EXECUTION

2.01 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 3. Provide, erect, and maintain temporary barriers and security devices.
 - 4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 5. Do not close or obstruct roadways or sidewalks without permits from authority having jurisdiction.
 - 6. Conduct operations to minimize obstruction of public and private entrances and exits. Do not obstruct required exits at any time. Protect persons using entrances and exits from removal operations.
 - 7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon, or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Protect existing structures and other elements to remain in place and not removed.
 - 1. Provide bracing and shoring.
 - 2. Prevent movement or settlement of adjacent structures.
 - 3. Stop work immediately if adjacent structures appear to be in danger.

2.02 EXISTING UTILITIES

- A. Coordinate work with utility companies. Notify utilities before starting work, comply with their requirements, and obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

2.03 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Existing construction and utilities indicated on drawings are based on casual field observation and existing record documents only.
 - 1. Verify construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.
- B. Remove existing work as indicated and required to accomplish new work.
 - 1. Remove items indicated on drawings.
- C. Services including, but not limited to, HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications: Remove existing systems and equipment as indicated.
 - 1. Maintain existing active systems to remain in operation, and maintain access to equipment and operational components.
 - 2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - 3. Verify that abandoned services serve only abandoned facilities before removal.
 - 4. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings. Remove back to source of supply where possible, otherwise cap stub and tag with identification.
- D. Protect existing work to remain.
 - 1. Prevent movement of structure. Provide shoring and bracing as required.
 - 2. Perform cutting to accomplish removal work neatly and as specified for cutting new work.
 - 3. Repair adjacent construction and finishes damaged during removal work.
 - 4. Patch to match new work.

2.04 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

**SECTION 032000
CONCRETE REINFORCING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Reinforcing steel for cast-in-place concrete.
- B. Supports and accessories for steel reinforcement.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete.
- B. Section 033800 - Post-Tensioned Concrete.
- C. Section 042000 - Unit Masonry: Reinforcement for masonry.

1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Concrete Construction 2020.
- B. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).
- C. ACI SP-66 - ACI Detailing Manual 2004.
- D. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- E. ASTM A641/A641M - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire 2019.
- F. ASTM A706/A706M - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement 2022a.
- G. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.
- H. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars 2022.
- I. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement 2019, with Editorial Revision (2020).
- J. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- K. ASTM A1094/A1094M - Standard Specification for Continuous Hot-Dip Galvanized Steel Bars for Concrete Reinforcement 2020.
- L. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars 2021.
- M. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- N. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars 2018, with Amendment (2020).
- O. CRSI (DA4) - Manual of Standard Practice 2018, with Errata (2019).
- P. CRSI (P1) - Placing Reinforcing Bars, 10th Edition 2019.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.
- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- D. Shear Rails

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.4/D1.4M and no more than 12 months before start of scheduled welding work.

PART 2 PRODUCTS

2.01 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Unfinished below grade only.
 - 2. Epoxy coated in accordance with ASTM A775/A775M.
- B. Reinforcing Steel: ASTM A706/A706M, deformed low-alloy steel bars.
 - 1. Epoxy coated in accordance with ASTM A775/A775M.
- C. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide stainless steel components for placement within 1-1/2 inches of weathering surfaces.
 - 4. Shear Rails AWS D1.1 and ASTM A108 grades 1010-1020

2.02 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.
- B. Welding of reinforcement is permitted only with the specific approval of Engineer. Perform welding in accordance with AWS D1.4/D1.4M.
 - 1. Galvanized Reinforcement: Clean surfaces, weld and re-protect welded joint in accordance with CRSI (DA4).
- C. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.

- D. Locate reinforcing splices not indicated on drawings at point of minimum stress.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.
- D. Comply with applicable code for concrete cover over reinforcement.
- E. Bond and ground all reinforcement to requirements of Section 260526.

3.02 FIELD QUALITY CONTROL

- A. An independent testing agency hired by contractor as specified in Section 014000 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION

**SECTION 033000
CAST-IN-PLACE CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete formwork.
- B. Concrete building frame members.
- C. Concrete for composite floor construction.
- D. Elevated concrete slabs.
- E. Floors and slabs on grade.
- F. Concrete crash walls, foundation walls, stairs
- G. Concrete foundations
- H. Concrete reinforcement.
- I. Shear Rails
- J. Joint devices associated with concrete work.
- K. Miscellaneous concrete elements, including equipment pads, equipment pits, light pole bases, flagpole bases, thrust blocks, and manholes.
- L. Concrete curing.

1.02 SUMMARY

- A. Section includes cast-in place concrete, including concrete materials, mixture design, placement procedures, and finishes.

1.03 RELATED REQUIREMENTS

- A. Crystalline Waterproofing Admixture
- B. Water repellents
- C. Traffic Coatings:
- D. Section 079200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.
- E. Section 079513 - Expansion Joint Cover Assemblies.
- F. Section 321313 - Concrete Paving: Sidewalks, curbs and gutters.

1.04 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
- B. The basis for designing concrete mixtures and demonstrating compliance with carbon budget targets shall be in accordance with:
 - 1. National Ready Mixed Concrete Association (NRMCA) Cradle-to-Gate Life Cycle Assessment of Ready-Mixed Concrete Manufactured by NRMCA Members – Version 3 (or later).
 - 2. National Ready Mixed Concrete Association, NRMCA Member Industry Average EPD for Ready Mixed Concrete – Version 3 (or later).

1.05 REFERENCE STANDARDS

- A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).
- B. ACI 211.1 - Selecting Proportions for Normal-Density and High Density-Concrete - Guide 2022.
- C. ACI 211.2 - Standard Practice for Selecting Proportions for Structural Lightweight Concrete 1998 (Reapproved 2004).
- D. ACI 301 - Specifications for Concrete Construction 2020.

- E. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- F. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- G. ACI 305R - Guide to Hot Weather Concreting 2020.
- H. ACI 306R - Guide to Cold Weather Concreting 2016.
- I. ACI 308R - Guide to External Curing of Concrete 2016.
- J. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).
- K. ACI 347R - Guide to Formwork for Concrete 2014 (Reapproved 2021).
- L. ACI PRC-223 - Shrinkage-Compensating Concrete - Guide 2021.
- M. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- N. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.
- O. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars 2022.
- P. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement 2019, with Editorial Revision (2020).
- Q. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- R. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- S. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.
- T. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- U. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens) 2021.
- V. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.
- W. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- X. ASTM C157/C157M - Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete 2017.
- Y. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2020.
- Z. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.
- AA. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- BB. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2019.
- CC. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars 2021.
- DD. ASTM C476 - Standard Specification for Grout for Masonry 2023.
- EE. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019, with Editorial Revision (2022).
- FF. ASTM C579 - Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes 2018.
- GG. ASTM C618 - Standard Specification for Coal Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2023, with Editorial Revision.
- HH. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2017.

- II. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures 2016.
- JJ. ASTM C845/C845M - Standard Specification for Expansive Hydraulic Cement 2018.
- KK. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.
- LL. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.
- MM. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2020.
- NN. ASTM C1116/C1116M - Standard Specification for Fiber-Reinforced Concrete 2010a (Reapproved 2015).
- OO. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures 2020.
- PP. ASTM C1311 - Standard Specification for Solvent Release Sealants 2022.
- QQ. ASTM C1582/C1582M - Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete 2011, with Editorial Revision (2017).
- RR. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- SS. ASTM C1708/C1708M - Standard Test Methods for Self-leveling Mortars Containing Hydraulic Cements 2019.
- TT. ASTM D994/D994M - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type) 2011 (Reapproved 2022).
- UU. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- VV. ASTM D1752 - Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction 2018.
- WW. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting 2015.
- XX. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars 2021.
- YY. ASTM D5084 - Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter 2016a.
- ZZ. ASTM D8139 - Standard Specification for Semi-Rigid, Closed-Cell Polypropylene Foam, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction 2017.
- AAA. ASTM E154/E154M - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover 2008a (Reapproved 2019).
- BBB. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs 2018a.
- CCC. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs 2017.
- DDD. COE CRD-C 48 - Handbook for Concrete and Cement Standard Test Method for Water Permeability of Concrete 1992.
- EEE. COE CRD-C 513 - Handbook for Concrete and Cement Corps of Engineers Specifications for Rubber Waterstops 1974.
- FFF. COE CRD-C 572 - Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop 1974.
- GGG. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair 2013.

HHH. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.

III. NSF 372 - Drinking Water System Components - Lead Content 2022.

1.06 DEFINITIONS

- A. Cementitious Materials: materials that have cementing value if used in grout, mortar, or concrete, including portland cement, blended hydraulic cements, expansive cement, fly ash, raw or calcined natural pozzolan, ground glass pozzolan, slag cement, and silica fume.
- B. Water-to Cementitious Materials Ratio (w/cm): ratio of mass of water, excluding that absorbed by aggregate, to the mass of cementitious materials in a mixture, stated as a decimal.

1.07 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
- C. Mix Design: Submit proposed concrete mix design.
 - 1. Indicate proposed mix design complies with fiber reinforcing manufacturer's written recommendations.
 - 2. Indicate proposed mix design complies with admixture manufacturer's written recommendations.
- D. Samples: Submit samples of underslab vapor retarder to be used. Stair non-slip nosings
- E. Samples: Submit two, 12 inch long samples of waterstops and construction joint devices.
- F. Test Reports: Submit report for each test or series of tests specified.
- G. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.
- H. Sustainable Design Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.
- I. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.
- J. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- K. Concrete Submittals - For each concrete mixture, submit the following:
 - 1. Mixture Identification by class
 - 2. Type and source information on concrete materials proposed for use including:
 - a. Cementitious Materials
 - b. Aggregates
 - c. Mineral Fillers
 - d. Admixtures
 - e. Water
 - f. Fibers, color pigments, and other additions
 - 3. Compressive strength, f'_c , applicable for the class
 - 4. Required average compressive strength, f'_{cr} , for each class of concrete
 - 5. Documentation of strength test records of similar class of concrete used to establish standard deviation in accordance with ACI 301, when test records exist
 - 6. Documentation of compliance with f'_{cr} of proposed mixture(s) and test age
 - 7. Strength of concrete at other specified ages
 - 8. The applicable durability exposure classes for each class of concrete.
 - 9. w/cm of proposed concrete mixtures, when specified
 - 10. Nominal maximum aggregate size or Size number (ASTM C33) of coarse aggregate
 - 11. Target slump or slump flow

12. Air content of concrete assigned to Exposure Classes F1, F2, and F3
 13. Density, if specified
 14. Documentation of compliance with maximum limits on supplementary cementitious materials for concrete assigned to Exposure Class F3
 15. Cementitious materials and documentation of tests or service for concrete assigned to Exposure Class S1, S2, and S3
 16. Documentation on chloride content of concrete mixtures for conformance to limits in Exposure Class C – calculated total chloride or measured water-soluble chlorides by ASTM C1218/C1218M, expressed as a percentage of cementitious materials.
 17. Documentation on alkali aggregate reactivity for concrete assigned to Exposure Class W1 or W2, as specified
 18. Intended placement method
 19. Equilibrium density of lightweight concrete and correlated density of fresh concrete, if specified
 20. Documentation supporting other specified requirements of concrete mixtures
 21. Anticipated changes to concrete mixtures for anticipated routine variability of in materials, and changes in project conditions, weather, test results, or other circumstances that warrant adjustments
- L. Concrete Mixture Certification: For each class of concrete:
1. Signed and sealed by professional engineer licensed in the state of the Project.
 2. Documentation of test results indicating compliance with specified requirements for each concrete mixture
 3. Identity characteristics of each mixture that will be used for quality assurance during construction
- M. Material Certificates: For each material provided by the material supplier
1. Cementitious materials
 2. Aggregates
 3. Admixtures
 4. Fiber Reinforcement
 5. Curing compounds
 6. Floor and slab treatments
 7. Bonding agents
 8. Adhesives
 9. Vapor retarders
 10. Joint fillers
 11. Repair materials
- N. Material Test Reports: For the following, from a qualified testing agency
1. Portland cement
 2. Portland-Limestone cement
 3. Fly ash
 4. Slag cement
 5. Blended hydraulic cement
 6. Silica fume
 7. Performance-based hydraulic cement
 8. Aggregates
 9. Admixtures

1.08 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.09 QUALITY ASSURANCE

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
 1. Maintain one copy of each document on site.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.
- D. Ready Mixed Concrete Manufacturer Qualifications: A company manufacturing ready mixed concrete who complies with ASTM C94/C94M requirements for production facilities and equipment
 1. Concrete shall be supplied from concrete plants with current certification under the NRMCA Certification of Ready Mixed Concrete Production Facilities, certification or approval by a state or highway agency or equivalent. Criteria of equivalent certification shall be included in the submittal.
 2. Quality Control personnel with responsibility for concrete mixtures shall document qualifications demonstrating knowledge and experience with concrete technology and development of performance-based concrete mixtures. certified as an NRMCA Concrete Technologist Level 2, or equivalent. Details covered in equivalent certification program shall be documented in the submittal.
 3. When requested, the manufacturer shall furnish a Quality Plan.
- E. Testing Agency Qualifications: Independent testing agency complying with the requirements of ASTM C1077 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.
 1. Personnel performing field tests for acceptance shall be certified as ACI Concrete Field Testing Technician Grade I, or equivalent.
 2. Personnel conducting laboratory tests for acceptance shall be certified as ACI Concrete Strength Testing Technician or ACI Concrete Laboratory Testing Technician – Level I, or equivalent.
 3. Test results for the purpose of acceptance shall be certified by a registered design professional employed with the Testing Agency.

1.10 MOCK-UP

- A. Construct and erect mock-up panels for the elevated parking slabs
 1. Panel Size: 12 feet by 12 feet
 2. Slope, mock up to be poured at 5% slope
- B. Accepted mock-up panel is considered basis of quality for the finished work. Keep mock-up exposed to view for duration of concrete work.

1.11 SLAB PRE-COSNTRUCTION MEETING

- A. At least 20 days prior to placing first concrete floor slab, Contractor shall hold a meeting to review detailed requirements for preparing final concrete design mixes and to establish procedures for placing, finishing, curing, and protecting concrete to meet required quality under anticipated conditions.
- B. Contractor shall request responsible representatives of each party concerned with concrete work to attend a meeting, including but not limited to the following:
 - 1. Contractor's Superintendent.
 - 2. Structural Engineer.
 - 3. Testing Laboratory responsible for field quality control.
 - 4. Concrete Subcontractor's Project Manager.
 - 5. Ready-mix Concrete Supplier.
 - 6. Architect.
- C. Minutes of the meeting shall be recorded, typed, reproduced and distributed by Contractor to all parties concerned within five working days of meeting.
- D. Minutes shall include a statement by admixture manufacturer(s) indicating that proposed mix design and placing can produce concrete quality required by this Section.
- E. Contractor shall notify Structural Engineer and Architect at least 10 days prior to scheduled date of meeting.
- F. During construction, additional meetings may be held to review and modify procedures and materials established to assure attainment of required quality level.

1.12 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 FORMWORK

- A. Comply with requirements of Section 031000.
- B. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.
- C. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
 - 1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance.
 - 2. Form Facing for Exposed Finish Concrete: Steel.
 - 3. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
 - 4. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
 - 5. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
 - 1. Type: Deformed billet-steel bars.
 - 2. Finish: Unfinished below grade.
 - 3. Finish: Epoxy coated in accordance with ASTM A775/A775M, unless otherwise indicated.
- B. Reinforcement Accessories:
 - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
 - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
 - 3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of exposed surfaces.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
- C. Fly Ash: ASTM C618, Class C or F.
- D. Ground Granulated Blast furnace Slag, ASTM C989, Grade 100 or 120
- E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.
- F. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
- G. Structural Fiber Reinforcement: ASTM C1116/C1116M.
 - 1. Fiber Type: Alkali-resistant synthetic.
 - a. Products:
 - 1) Fibermesh; Fibermesh 650: www.fibermesh.com/#sle.
 - 2) Forta Corporation; FORTA-FERRO (2-1/4"): www.forta-ferro.com/#sle.
 - 3) GCP Applied Technologies; STRUX 90/40: www.gcpat.com/#sle.
 - 4) GCP Applied Technologies; STRUX BT50: www.gcpat.com/#sle.
 - 5) Substitutions: See Section 016000 - Product Requirements.

2.04 ADMIXTURES

- A. Chemical Admixture:
- B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.
- C. Air Entrainment Admixture: ASTM C260/C260M.
- D. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.
- E. High Range Water Reducing Admixture: ASTM C494/C494M Type F.
- F. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.
- G. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.
- H. Accelerating Admixture: ASTM C494/C494M Type C.
- I. Retarding Admixture: ASTM C494/C494M Type B.
- J. Water Reducing Admixture: ASTM C494/C494M Type A.
- K. Shrinkage Reducing Admixture:
 - 1. ASTM C494/C494M, Type S.
- L. Shrinkage Compensating Admixture: For on site production of concrete with ASTM C845/C845M, Type K cement.
- M. Shrinkage Compensating Admixture with Fiber Reinforcement: For on site production of concrete with ASTM C845/C845M, Type K cement with integral fiber reinforcement.
- N. Waterproofing Admixture: Admixture formulated to reduce permeability to liquid water, with no adverse effect on concrete properties.
 - 1. Admixture Composition: Crystalline, functioning by growth of crystals in capillary pores.
 - 2. Crystalline waterproofing powder shall be added to concrete mix at time of batching at a rate of 2 percent by weight of cementitious content.
 - 3. Products:
 - a. BASF: MasterLife 3000D
 - b. Kryton International, Inc; Krystol Internal Membrane (KIM): www.kryton.com/#sle.
 - c. Xypex Chemical Corporation; XYPEX Admix C-500: www.xypex.com/#sle.

2.05 ACCESSORY MATERIALS

- A. Underslab Vapor Retarder:
 - 1. Sheet Material: ASTM E1745, Class A; stated by manufacturer as suitable for installation in contact with soil or granular fill under concrete slabs. Single-ply polyethylene is prohibited.

2. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
- B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 1. Grout: Comply with ASTM C1107/C1107M.
 2. Height Change, Plastic State; when tested in accordance with ASTM C827/C827M:
 - a. Maximum: Plus 4 percent.
 - b. Minimum: Plus 1 percent.
 3. Minimum Compressive Strength at 48 Hours, ASTM C109/C109M: 2,000 pounds per square inch.
 4. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.

2.06 BONDING AND JOINTING PRODUCTS

- A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
- B. Waterstops: PVC, complying with COE CRD-C 572.
- C. Reglets: Formed steel sheet, galvanized, with temporary filler to prevent concrete intrusion during placement.
 1. Size: 1/2 inch throat, 1/2 inch deep.
- D. Stair Non-Slip Hosings: See Drawings
- E. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
 1. Material: Closed-cell, non-absorbent, compressible polymer foam in sheet form.
- F. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.
- G. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches on center; ribbed steel stakes for setting.

2.07 CURING MATERIALS

- A. Moisture-Retaining Sheet: ASTM C171.
 1. White-burlap-polyethylene sheet, weighing not less than 3.8 ounces per square yard.
- B. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

- A. Prepare design mixtures for each type and strength of concrete on the basis of laboratory trial mixtures or field test data, or both according to ACI 301.
- B. Cementitious Materials: Limit percentage, by weight of cementitious materials other than portland cement in concrete for concrete assigned to Exposure Class F3 as follows:
 1. Fly ash or other pozzolans: 25 percent maximum and 12 percent minimum by mass
 2. Slag Cement: 25 percent maximum and 12 percent minimum by mass
 3. Silica Fume: 10 percent maximum or 0 percent minimum by mass
 4. Total of fly ash or natural pozzolans and silica fume: 35 percent maximum by mass
 5. Total of fly ash or natural pozzolans, slag cement, and silica fume: 40 percent maximum by mass
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.
- D. Fiber Reinforcement: Add to mix at rate of 3.5 pounds per cubic yard in all slabs on grade.
- E. Shrinkage: mixes to conform to ASTM C157, 0.05%.
- F. Permeability: bulk resistivity per ASTM C1876, 120 ohm.m.
- G. Alkali-Silica Reaction limits: per ASTM C1293 and ASTM C1567

2.09 SCHEDULE OF MIXES

- A. Footings: Proportion normal-weight concrete mix as follows:
 - 1. Compressive Strength (28 days): 4000 psi
 - 2. Maximum Aggregate Size: 1-1/2 inch
 - 3. In-situ carbon dioxide mineralization
 - 4. Exposure categories and classes per ACI-318: F0, S1, W0, C1
 - 5. Permeability, RCP - ASTM C1202, 2500 coulombs
- B. Lean mix fill: Proportion normal-weight concrete mix as follows:
 - 1. Compressive Strength (28 days): 1000 psi
 - 2. Maximum Aggregate Size: 1-1/2 inch
- C. Columns: Proportion normal-weight concrete mix as follows:
 - 1. Compressive Strength (28 days): 5000 psi
 - 2. Maximum Aggregate Size: 3/4 inch
 - 3. Exposure categories and classes per ACI-318: F2, S0, W2, C1
 - 4. Permeability, RCP - ASTM C1202, 2000 coulombs
- D. Foundation and Retaining Walls: Proportion normal-weight concrete mix as follows:
 - 1. Compressive Strength (28 days): 4000 psi
 - 2. Maximum Aggregate Size: 3/4 inch
 - 3. Exposure categories and classes per ACI-318: F1, S1, W1, C1
- E. Crash and Barrier Walls Above Grade: Proportion normal-weight concrete mix as follows:
 - 1. Compressive Strength (28 days): 4000 psi
 - 2. Maximum Aggregate Size: 3/4 inch
 - 3. Air Entrainment: 6 percent air content
 - 4. Exposure categories and classes per ACI-318: F2, S0, W2, C1
- F. Elevated Parking Decks, Elevator Lobbies, Stairs, Intermediate Stair Landings: Proportion normal-weight concrete mix as follows:
 - 1. Compressive Strength (28 days): 6000 psi
 - 2. Compressive Strength (2 days): 3000 psi
 - 3. Maximum Aggregate Size: 3/4 inch
 - 4. Air Entrainment: 6 percent air content required with an acceptable air content of plus or minus 1.5 percent
 - 5. Corrosion inhibitor
 - 6. Exposure categories and classes per ACI-318: F3, S1, W2, C2
 - 7. Permeability, RCP - ASTM C1202, 2000 coulombs
- G. Slab on Ground, Equipment Pads: Proportion normal-weight concrete mix as follows:
 - 1. Compressive Strength (28 days): 4000 psi
 - 2. Maximum Aggregate Size: 1 inch
 - 3. Macro synthetic fibers: 3.5 pounds per cubic yard
 - 4. Air Entrainment: 6 percent air content required with an acceptable air content of plus or minus 1.5 percent
 - 5. Exposure categories and classes per ACI-318: F3, S1, W2, C2

2.10 MIXING

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
 - 1. Fiber Reinforcement: Batch and mix as recommended by manufacturer for specific project conditions.
- B. Transit Mixers: Comply with ASTM C94/C94M.
- C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in accordance with bonding agent manufacturer's instructions.
 - 1. Use latex bonding agent only for non-load-bearing applications.
- E. Where new concrete with integral waterproofing is to be bonded to previously placed concrete, prepare surfaces to be treated in accordance with waterproofing manufacturer's instructions. Saturate cold joint surface with clean water, and remove excess water before application of coat of waterproofing admixture slurry. Apply slurry coat uniformly with semi-stiff bristle brush at rate recommended by waterproofing manufacturer.
- F. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade to receive floor coverings. Comply with ASTM E1643. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

- A. Fabricate and handle epoxy-coated reinforcing in accordance with ASTM D3963/D3963M.
- B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.04 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Place concrete with shrinkage-compensating expansive component in accordance with ACI PRC-223.
- D. Notify Engineer not less than 24 hours prior to commencement of placement operations.
- E. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- F. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.
- G. Finish lobby floors level and flat, unless otherwise indicated, within the tolerances specified below.
- H. Finish floors flat with slope to drain.

3.05 SLAB JOINTING

- A. Locate joints as indicated on drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

- D. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.
- E. Contraction Joint Devices: Use preformed joint device, with top set flush with top of slab.
- F. Construction Joints: Where not otherwise indicated, use metal combination screed and key form, with removable top section for joint sealant.

3.06 FLOOR FLATNESS AND LEVELNESS TOLERANCES

- A. Maximum Variation of Surface Flatness:
 - 1. Exposed Concrete Floors: 1/4 inch in 10 feet.
- B. Correct the slab surface if tolerances are less than specified or does not drain.
- C. Minimum F(F) Floor Flatness and F(L) Floor Levelness Values:
 - 1. Exposed to View and Foot Traffic: F(F) of 20; F(L) of 15, on-grade only.
 - 2. Under Thick-Bed Tile: F(F) of 20; F(L) of 15, on-grade only.
 - 3. Under Carpeting: F(F) of 25; F(L) of 20, on-grade only.
 - 4. Under Thin Resilient Flooring and Thinset Tile: F(F) of 35; F(L) of 25, on-grade only.
 - 5. Parking Structure: F(F) of 20.
- D. Surface must drain.
- E. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.07 CONCRETE FINISHING

- A. Repair surface defects, immediately after removing formwork.
- B. Repair surface cracks with sealant or as directed by engineer.
- C. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
- D. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
 - 1. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
- E. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
 - 1. Other Surfaces to Be Left Exposed: Medium brush finish as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

3.08 CURING AND PROTECTION

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.
- D. Surfaces Not in Contact with Forms:
 - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
 - a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 3 days.
 - b. Spraying: Spray water over floor slab areas and maintain wet.
 - c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
 - 2. Final Curing: Begin after initial curing but before surface is dry.

- a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.

3.09 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
- B. Provide free access to concrete operations at project site and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.
- D. Tests of concrete and concrete materials may be performed at any time to ensure compliance with specified requirements.
- E. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cubic yards or less of each class of concrete placed.
- F. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.
- H. Slab Testing: Cooperate with manufacturer of specified moisture vapor reducing admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.
- I. Permeability Test: Test concrete with waterproofing admixture according to COE CRD-C 48.

3.10 DEFECTIVE CONCRETE

- A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.
- B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.
- C. Repair or replacement of defective concrete will be determined by the Engineer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.
- D. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of the Engineer for each individual area.

3.11 PROTECTION

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

**SECTION 033511
CONCRETE FLOOR FINISHES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Liquid densifiers and hardeners.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate the work with concrete floor placement and concrete floor curing.

1.04 SUBMITTALS

- A. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.07 FIELD CONDITIONS

- A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.
- B. Maintain ambient temperature of 50 degrees F minimum.

PART 2 PRODUCTS

2.01 DENSIFIERS AND HARDENERS

- A. SCON: Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores, hardening, and dustproofing.
 - 1. Composition: Sodium silicate.
 - a. Products:
 - 1) Euclid Chemical Company; EUCO DIAMOND
HARD: www.euclidchemical.com/#sle.
 - 2) Kaufman Products Inc; SureHard: www.kaufmanproducts.net/#sle.
 - 3) L&M Construction Chemicals, Inc, a subsidiary of Laticrete International, Inc;
SEAL HARD: www.lmcc.com/#sle.
 - 4) W. R. Meadows, Inc; Liqui-Hard: www.wrmeadows.com/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

- A. Apply materials in accordance with manufacturer's instructions.

3.03 COATING APPLICATION

- A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.
- B. Verify that water vapor emission from concrete and relative humidity in concrete are within limits established by coating manufacturer.
- C. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.
- D. Apply coatings in accordance with manufacturer's instructions, matching approved mock-ups for color, special effects, sealing and workmanship.

END OF SECTION

**SECTION 033800
POST-TENSIONED CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Cast-in-place post-tensioned concrete framing members and slabs.
- B. Sheathing-covered tensioning tendons for unbonded system.
- C. Fully encapsulated watertight tendon system including anchorages
- D. Barrier cables.

1.02 RELATED REQUIREMENTS

- A. Section 031000 - Concrete Forming and Accessories.
- B. Section 033000 - Cast-in-Place Concrete: Concrete product, mix, and testing requirements; floor slab tolerances; curing and repair.

1.03 REFERENCE STANDARDS

- A. ACI 117 - Specification for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).
- B. ACI 301 - Specifications for Concrete Construction 2020.
- C. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).
- D. ASTM A416/A416M - Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete 2018.
- E. ASTM A722/A722M - Standard Specification for High-Strength Steel Bars for Prestressed Concrete 2018.
- F. CRSI (DA1) - CRSI Design Handbook 2008.
- G. PTI TAB.1 - Post-Tensioning Manual 2006, Sixth Edition.

1.04 DESIGN REQUIREMENTS

- A. Design members exposed to the weather to accommodate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects, when subject to seasonal or cyclic day/night temperature changes.
- B. Design system to accommodate construction tolerances, deflection of other building structural members, and clearances of intended openings.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Discuss tendon locations, sleeve locations, and cautions regarding cutting or core drilling.

1.06 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate layout, tendon sizes, grouping, spacing, placing sequence, supports and locations, tendon supports, accessories, clearances required for jack, and pressure plate stresses; signed and sealed by professional engineer.
 - 1. Indicate formwork methods, materials, arrangement of joints, ties, shores, location of bracing and temporary supports, and schedule of erection and stripping.
 - 2. Describe tensioning sequence, type of jack, pressure monitoring device, anchorage set, tendon elongation and tendon cut-off procedures.
- C. Indicate formwork methods, materials, arrangement of joints, ties, shores, location of bracing and temporary supports, and schedule of erection and stripping.
- D. Describe tensioning sequence, type of jack, pressure monitoring device, anchorage set, tendon elongation and tendon cut-off procedures.
- E. Certificate: Certify that tendon strength characteristics meet or exceed specified requirements.

- F. Designer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Project Record Documents: Record actual locations of tendons; stressing sequence and tension loads established, elongation of tendon.

1.07 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
- D. Materials Resources Certificates:
 - 1. Certify recycled material content for recycled content products.
 - 2. Certify source for regional materials and distance from Project site.

1.08 VEHICULAR BARRIER CABLE SYSTEM

- A. General: System comprised of cable components installed parallel to each other. Length of spans as recommended by cable system manufacturer. Each cable assembly typically consists of cable with attachment at each end, and turnbuckle adjustment for tensioning cable system. Cable system manufacturer shall design cable system and include any post or plate requirements for appropriate strength.
- B. Cables: Seven wire steel strand cable, pre-stressed, 270 KSI 1/2 inch diameter; a center wire with 6 spirally wrapped wires around center wire. Galvanized finish.
- C. Column Inserts: Stainless steel, round loose sleeve through concrete columns, minimum 1/8 inch diameter larger than the cable diameter; interior open diameter of sleeve allowing cable to pass through. Provide at each cable passing through concrete columns. End column anchors cast-in or recessed into end columns.

1.09 QUALITY ASSURANCE

- A. Designer Qualifications: Design post-tensioned concrete under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of documented experience.

1.10 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.11 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Record actual locations of tendons; stressing sequence and tension loads established, measured elongation of tendons.
- C. Operation and Maintenance Data: Procedures for submittals.

1.12 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for sustainable design compliance.

PART 2 PRODUCTS

3.01 SUSTAINABILITY CHARACTERISTICS

- A. Materials and Resources Characteristics:
 - 1. Recycled Content Materials: Furnish materials with maximum available recycled content.
 - 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

3.02 FORMWORK

- A. Formwork: As specified in Section 033000.

3.03 REINFORCEMENT

- A. Tendon Strand: Factory assembled, ASTM A416/A416M, Grade 270 (1860) seven-wire stranded steel cable; low-relaxation type; full length without splices; weldless; covered with polyethylene sheathing providing free movement of tendon within sheathing; complete with end anchorages. Fully watertight encapsulated.
- B. Tendon Anchor: Type compatible with tendon, of strength not less than tendon.
- C. Tendon Coupling: Type compatible with tendon, of strength equal to or greater than tendon after attachment to tendons.
- D. Supplementary Reinforcement: As specified in Section 033000.

3.04 ACCESSORIES

- A. Tie Wire:
 - 1. Minimum 16 gauge, 0.0508 inch diameter, annealed type.
 - 2. An acceptable patented system.
- B. Chairs, Bolsters, Bar Supports, Spacers: Size and shape for strength and support of reinforcement during tendon location, installation, and placement of concrete.
- C. Markers: Colored plastic.
- D. Touch-up Primer: Corrosion resistive paint.

3.05 CONCRETE MATERIALS AND MIX DESIGN

- A. Concrete Materials: As specified in Section 033000.
- B. Mix Design: As specified in Section 033000.

3.06 GROUT

- A. Grout: Portland cement grout as specified in Section 03 60 00 - Grouting.

3.07 SOURCE QUALITY CONTROL

- A. An independent testing agency will conduct inspections and testing, as provided in Section 014000.
- B. See Section 033000 for testing of concrete materials and mix designs.
- C. Inspect and test stressing tendons before delivery to site for compliance with specified standards.

PART 3 EXECUTION

4.01 EXAMINATION

- A. Verify that site conditions are ready to receive work and field measurements are as indicated on shop drawings.

4.02 FORMWORK ERECTION

- A. Construct and support formwork in accordance with Section 033000.
- B. Provide supports and working space for tensioning jacks.
- C. Provide permanent tendon location markers.
- D. Install anchorage and connection devices.
- E. Install reglets.

4.03 REINFORCEMENT PLACEMENT

- A. Locate and position tendons. Protect from displacement. Protect from damage; replace if damaged.
 - 1. Maximum Distance from Indicated Position: 1/8 inch.
- B. Install tendons to vertical elevation and horizontal positions indicated on Drawings.
- C. Secure jack pressure plates in position perpendicular to line of stressing force.
- D. Maintain concrete cover around reinforcement in accordance with ACI 318.

4.04 PLACING CONCRETE

- A. Place concrete in accordance with Section 033000.
- B. Verify tendons, anchors, seats, plates, and other items to be cast into concrete are placed and secure.
- C. Tolerances:
 - 1. See Section 033000 for flatness tolerance requirements.
- D. See Section 033000 for finishing and curing requirements.

4.05 TENSIONING

- A. Perform tensioning after concrete has reached 3000 psi compressive strength and ambient temperature is above specified requirements, in one steps.
- B. Confirm concrete strength with test cylinders prior to tensioning.
- C. Measure prestressing force. Maintain jacking and tensioning records as work progresses.
- D. Jack against tendon pressure plate, not against concrete.
- E. Cut off excess tendon inside face of concrete. Apply touch-up primer to cut end.

4.06 GROUTING UNBONDED SYSTEM

- A. Grout fill anchorage pockets.

4.07 FIELD QUALITY CONTROL

- A. An independent testing agency will conduct field inspection and testing under provisions of Section 014000 - Quality Requirements.
- B. See Section 033000 for testing and inspection requirements.
- C. Field Testing:

1. Test Methods and Tests: As specified in Section 03 31 00 – Structural Concrete.

4.08 REMOVAL OF FORMS

- A. See Section 031000 for requirements for removal of forms.
- B. Do not remove forms, shores, and bracing until concrete has been tensioned to strength sufficient to carry its own weight, construction loads, and design loads.

4.09 REPAIR OF SURFACE DEFECTS

- A. Repair surface defects in accordance with Section 033000.
- B. Request examination of concrete surfaces upon removal of forms.
- C. Modify or repair concrete not complying with required lines, detail, and elevations.
- D. Modify or repair concrete not properly placed, resulting in honeycombing or other defects.

END OF SECTION

**SECTION 034113
PRECAST CONCRETE HOLLOW CORE PLANKS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Precast roof planks.
- B. Connection plates with brackets and hangers.
- C. Grouting plank joint keys.

1.02 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Concrete Construction 2020.
- B. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- E. ASTM A416/A416M - Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete 2018.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.
- H. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- I. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- J. AWS D1.4/D1.4M - Structural Welding Code - Steel Reinforcing Bars 2018, with Amendment (2020).
- K. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete 2017.
- L. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products 2021.
- M. PCI MNL-120 - PCI Design Handbook 2017, with Errata (2021).
- N. PCI MNL-123 - Connections Manual: Design and Typical Details of Connections for Precast and Prestressed Concrete 1988.
- O. PCI MNL-124 - Design for Fire Resistance of Precast Prestressed Concrete 2011.
- P. PCI MNL-126 - PCI Manual for the Design of Hollow Core Slabs and Walls 2015.
- Q. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction 2000.
- R. PCI (CERT) - PCI Plant Certification Current Edition.
- S. UL (FRD) - Fire Resistance Directory Current Edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Discuss anchor and weld plate locations, sleeve locations, and cautions regarding cutting or core drilling.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate standard component configuration, design loads, deflections, and cambers.
- C. Shop Drawings: Indicate plank locations, unit identification marks, connection details, edge conditions, bearing requirements, support conditions, dimensions, openings, openings intended

to be field cut, and relationship to adjacent materials.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Fabricator Qualifications: Precast concrete fabricator accredited by IAS according to IAS AC157.
- C. Welding Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M and no more than 12 months before start of scheduled welding work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.
- B. Mark each member with date of production and final position in structure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Precast Concrete Hollow Core Planks:
 - 1. Any manufacturer with PCI Plant Certification.
 - 2. Any manufacturer with NPCA Plant Certification.
 - 3. Substitutions: See Section 016000 - Product Requirements.

2.02 PRECAST UNITS

- A. Precast Hollow Core Planks: Comply with PCI MNL-120, PCI MNL-126, PCI MNL-124 ACI 318, and ACI 301.
 - 1. Design components to withstand dead loads and design loads in the configuration indicated on drawings and as follows:
 - a. Roof Assembly: 60 pounds per square foot live load.

- b. Maximum Allowable Deflection of Roof Planks: $1/180$ of span , cambered to achieve slope to drain.
- 2. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with strength requirements.
- 3. Design connections in accordance with PCI MNL-123.
- 4. Design components to accommodate construction tolerances, deflection of other building structural members and clearances of intended openings.
- 5. Grouted Keys: Capable of transmitting horizontal shear force of 2,000 pounds per linear foot.
- 6. Fire Resistance: Design planks in accordance with PCI MNL-124 to achieve hourly ratings as follows:
 - a. Roof Assembly: 2 hour.

2.03 MATERIALS

- A. Concrete Materials: ACI 301.
- B. Tensioning Steel Tendons: ASTM A416/A416M, Grade 250 - 250K psi; seven-wire stranded steel cable; low-relaxation type; full length without splices; weldless; uncoated.
- C. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi) deformed steel bars.
- D. Non-Shrink Grout: Non-metallic, minimum compressive strength of 10,000 psi at 28 days.
- E. Cement Grout: Minimum compressive strength of 3,000 psi at 28 days.

2.04 ACCESSORIES

- A. Connecting and Supporting Devices: Plates, angles, items cast into concrete, items connected to steel framing members, and inserts: ASTM A36/A36M carbon steel; prime painted.

2.05 FABRICATION

- A. Weld reinforcing in accordance with AWS D1.4/D1.4M.
- B. Embed anchors, inserts, plates, angles, and other items at locations indicated.
- C. Provide openings required by other sections, at locations indicated.
- D. Cut exposed ends flush.
- E. Plant Finish: Finish members to PCI MNL-116 Commercial Grade.

2.06 FABRICATION TOLERANCES

- A. Comply with PCI MNL-116 and PCI MNL-135.

2.07 SOURCE QUALITY CONTROL

- A. Produce planks in accordance with requirements of PCI MNL-116. Maintain plant records and quality control program during production of precast planks. Make records available upon request.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that site conditions are ready to receive work and field measurements are as indicated on shop drawings.
- B. Verify supporting structure is ready to receive work.

3.02 PREPARATION

- A. Prepare support devices for the erection procedure and temporary bracing.

3.03 ERECTION

- A. Erect members without damage to structural capacity, shape, or finish. Replace or repair damaged members.
- B. Align and maintain uniform horizontal and end joints, as erection progresses.

- C. Maintain temporary bracing in place until final connection is made. Protect members from staining.

3.04 TOLERANCES

- A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135.

3.05 PROTECTION

- A. Protect members from damage caused by field welding or erection operations.

3.06 CLEANING

- A. Clean weld marks, dirt, and blemishes from surface of exposed members.

END OF SECTION

**SECTION 034500
PRECAST ARCHITECTURAL CONCRETE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural precast concrete snow chute.
- B. Architectural precast concrete accessories.
- C. Supports, anchors, and attachments.
- D. Grouting under panels.

1.02 RELATED REQUIREMENTS

- A. Section 032000 - Concrete Reinforcing.
- B. Section 033000 - Cast-in-Place Concrete: Admixtures.
- C. Section 079200 - Joint Sealants: Sealing perimeter and intermediate joints.

1.03 REFERENCE STANDARDS

- A. ACI 301 - Specifications for Concrete Construction 2020.
- B. ACI 318 - Building Code Requirements for Structural Concrete 2019, with Errata (2021).
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2021.
- G. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric) 2021a.
- H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- I. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.
- J. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars 2022.
- K. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings 2020.
- L. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement 2019, with Editorial Revision (2020).
- M. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- N. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field 2022.
- O. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- P. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- Q. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- R. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2022.
- S. ASTM C989/C989M - Standard Specification for Slag Cement for Use in Concrete and Mortars 2022.

- T. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures 2020.
- U. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars 2021.
- V. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- W. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2021).
- X. IAS AC157 - Accreditation Criteria for Fabricator Inspection Programs for Reinforced and Precast/Prestressed Concrete 2017.
- Y. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products 2013.
- Z. PCI MNL-120 - PCI Design Handbook 2017, with Errata (2021).
- AA. PCI MNL-122 - Architectural Precast Concrete: Fully Revised Manual Including New Sections, Extensive Updates, and Detailed Specifications to Meet Today's Construction Needs. 2007.
- BB. PCI MNL-123 - Connections Manual: Design and Typical Details of Connections for Precast and Prestressed Concrete 1988.
- CC. PCI MNL-135 - Tolerance Manual for Precast and Prestressed Concrete Construction 2000.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.
- C. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, integral insulation, insulated panel system connectors, connection details, support items, location of lifting devices, dimensions, openings, and relationship to adjacent materials. Provide erection drawings.
 - 1. Include details of mix designs.
 - 2. Include structural design calculations.
- D. Designer's Qualification Statement.
- E. Sustainable Design Reporting: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete, mix design(s) used showing the quantity of Portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.
- F. Maintenance Data: Indicate surface cleaning instructions.

1.05 QUALITY ASSURANCE

- A. Design Engineer Qualifications: Design precast concrete units under direct supervision of a Professional Structural Engineer experienced in design of precast concrete and licensed in the State in which the Project is located.
- B. Fabricator Qualifications:
 - 1. Firm having at least 2 years of documented experience in production of precast concrete of the type required.
 - 2. Plant certified under Precast/Prestressed Concrete Institute Plant Certification Program; product group and category A1 - Architectural Precast Concrete.
 - 3. Plant certified under Architectural Precast Association Plant Certification Program for production of architectural precast concrete.
 - 4. Fabricator Qualifications: Precast concrete fabricator accredited by IAS according to IAS AC157.
- C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handling: Lift and support precast units only from support points.
- B. Blocking and Lateral Support During Transport and Storage: Use materials that are clean, non-staining, and non-harmful to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.
- C. Protect units to prevent staining, chipping, or spalling of concrete.
- D. Mark units with date of production in location that will be concealed after installation.

PART 2 PRODUCTS

2.01 PRECAST UNITS, GENERAL

- A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.
 - 1. Concrete Face Mix: Minimum 5000 psi, 28 day strength, air entrained to 5 to 7 percent; comply with ACI 301.
 - 2. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
 - 3. Calculate structural properties of units in accordance with ACI 318.
 - 4. Other Cementitious Materials: Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with strength and appearance requirements.
 - 5. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
 - 6. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.
- B. Finish Type A: Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.

2.02 REINFORCEMENT

- A. Comply with requirements of Section 033000.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 40 (40,000 psi).
 - 1. Epoxy coated in accordance with ASTM A775/A775M.

2.03 CONCRETE MATERIALS

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
- B. Other Cementitious Materials:
 - 1. Fly Ash or Natural Pozzolans: Comply with ASTM C618.
 - 2. Ground Granulated Blast Furnace Slag: ASTM C989/C989M.
 - 3. Silica Fume: Comply with ASTM C1240.
- C. Fine and Coarse Structural Aggregates: ASTM C33/C33M.
- D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.
- E. Air Entrainment Admixture: ASTM C260/C260M.
- F. Admixtures: Air entrainment as specified in Section 033000.
- G. Grout:
 - 1. Non-shrink, non-metallic, minimum 10,000 psi, 28 day strength.

2.04 REVEAL AND ACCENT STRIPS

- A. Material: Non-staining, non-reactive, high-density polyethylene.
- B. Profile(s): As selected by Architect from manufacturer's standard range.
- C. Profile(s): As indicated on drawings.

2.05 SUPPORT DEVICES

- A. Connecting and Support Devices; Anchors and Inserts: ASTM A36/A36M steel; hot-dip galvanized in accordance with ASTM A153/A153M.
 - 1. Clean surfaces of rust, scale, grease, and foreign matter.
 - 2. Galvanize after fabrication in accordance with requirements of ASTM A123/A123M.
- B. Bolts, Nuts, and Washers: ASTM A307 heavy hex bolts, Type A, hot-dip galvanized, with matching ASTM A563/A563M nuts and matching washers.
- C. Primer: Zinc rich type.

2.06 FABRICATION

- A. Fabricate in compliance with PCI MNL-117 and PCI MNL-135.
- B. Fabricate and handle epoxy-coated reinforcing bars in accordance with ASTM D3963/D3963M.
- C. Maintain plant records and quality control program during production of precast units. Make records available upon request.
- D. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.
- E. Use form liners in accordance with manufacturer's instructions.
- F. Maintain consistent quality during manufacture.
- G. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.
- H. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.
- I. Locate hoisting devices to permit removal after erection.
- J. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.
- K. Minor patching in plant is acceptable, providing structural adequacy and appearance of units is not impaired.

2.07 FABRICATION TOLERANCES

- A. Comply with PCI MNL-117 and PCI MNL-135, except as specifically amended below.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building structure, anchors, devices, and openings are ready to receive work of this section.

3.02 PREPARATION

3.03 ERECTION

- A. Erect units without damage to shape or finish. Replace or repair damaged panels.
- B. Erect units level and plumb within allowable tolerances.
- C. Align and maintain uniform horizontal and vertical joints as erection progresses.
- D. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise Architect.
- E. Fasten units in place with mechanical connections.
- F. Weld units in place. Perform welding in accordance with AWS D1.1/D1.1M.
- G. Provide non-combustible shields during welding operations.
- H. Touch-up field welds and scratched or damaged primed painted surfaces.
- I. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers. Pack grout to base of unit.
- J. Exposed Joint Dimension: 1/2 inch. Adjust units so that joint dimensions are within tolerances.

3.04 TOLERANCES

- A. Erect members level and plumb within allowable tolerances. Comply with PCI MNL-135, except as specifically amended below.
 - 1. Exposed Joint Dimension: Plus or minus 3/16 inch.

END OF SECTION

**SECTION 042000
UNIT MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Concrete block.
- B. Clay facing brick.
- C. Mortar and grout.
- D. Reinforcement and anchorage.
- E. Flashings.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 071113 - Bituminous Dampproofing: Dampproofing parged masonry surfaces.
- B. Section 079200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
- C. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- E. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement.
- F. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- G. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
- H. ASTM C129 - Standard Specification for Nonloadbearing Concrete Masonry Units.
- I. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
- J. ASTM C150/C150M - Standard Specification for Portland Cement.
- K. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
- L. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale).
- M. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
- N. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
- O. ASTM C476 - Standard Specification for Grout for Masonry.
- P. ASTM C744 - Standard Specification for Prefaced Concrete and Calcium Silicate Masonry Units.
- Q. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
- R. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete.
- S. ASTM C1072 - Standard Test Methods for Measurement of Masonry Flexural Bond Strength.
- T. ASTM C1314 - Standard Test Method for Compressive Strength of Masonry Prisms.

- U. ASTM C1714/C1714M - Standard Specification for Preblended Dry Mortar Mix for Unit Masonry.
- V. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- W. ASTM E514/E514M - Standard Test Method for Water Penetration and Leakage Through Masonry.
- X. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing.
- Y. BIA Technical Notes No. 13 - Ceramic Glazed Brick Exterior Walls.
- Z. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls.
- AA. BIA Technical Notes No. 46 - Maintenance of Brick Masonry.
- BB. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.05 SUBMITTALS

- A. Product Data: Provide data for masonry units, fabricated wire reinforcement, mortar, and masonry accessories.
- B. Samples: Submit four samples of decorative block and facing brick units to illustrate color, texture, and extremes of color range.
- C. Manufacturer's Certificate: Certify that water repellent admixture manufacturer has certified masonry unit manufacturer as an approved user of water repellent admixture in the manufacture of concrete block.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 MOCK-UPS

- A. Construct a masonry wall as a mock-up panel sized 4 feet long by 4 feet high for each type of masonry; include mortar in mock-up.
- B. Locate where directed.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
 - 1. Size: Standard units with nominal face dimensions of 16 by 8 inches and nominal depths as indicated on drawings for specific locations.
 - 2. Special Shapes: Provide nonstandard blocks configured for corners.
 - a. Provide bullnose units for outside corners.
 - 3. Load-Bearing Units: ASTM C90, normal weight.
 - a. Exposed Faces: Manufacturer's standard color and texture where indicated.
 - 4. Nonloadbearing Units: ASTM C129.
 - a. Hollow block, as indicated.
 - b. Lightweight.
 - 5. Split-Faced Units: ASTM C90, hollow block.
 - a. Colors and styles: As selected.
 - 6. Units with Integral Water Repellent: Concrete block units as specified in this section with polymeric liquid admixture added to concrete masonry units at the time of manufacture.
 - a. Performance of Units with Integral Water Repellent:
 - 1) Water Permeance: When tested per ASTM E514/E514M and for a minimum of 72 hours.
 - (a) No water visible on back of wall above flashing at the end of 24 hours.
 - (b) No flow of water from flashing equal to or greater than 0.032 gallons per hour at the end of 24 hours.
 - (c) No more than 25 percent of wall area above flashing visibly damp at end of test.
 - 2) Flexural Bond Strength: ASTM C1072; minimum 10 percent increase.
 - 3) Compressive Strength: ASTM C1314; maximum 5 percent decrease.
 - b. Use only in combination with mortar that also has integral water repellent admixture.
 - c. Use water repellent admixtures for masonry units and mortar by a single manufacturer.

2.02 BRICK UNITS

- A. Facing Brick: ASTM C216, Type FBX, Grade SW.
 - 1. Color and texture: Endicott Medium Ironspot; Velour to match existing brick. Submit for Architect approval.
 - 2. Nominal size: As indicated on drawings.
 - 3. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.03 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Aggregate: ASTM C144.
- D. Grout Aggregate: ASTM C404.

- E. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 - 1. Color(s): As selected by Architect from manufacturer's full range to match existing mortar.
- F. Water: Clean and potable.
- G. Accelerating Admixture: Nonchloride type for use in cold weather.
- H. Integral Water Repellent Admixture for Mortar: Polymeric liquid admixture added to mortar at the time of manufacture.
 - 1. Use only in combination with masonry units manufactured with integral water repellent admixture.
 - 2. Use only water repellent admixture for mortar from the same manufacturer as water repellent admixture in masonry units.
 - 3. Meet or exceed performance specified for water repellent admixture used in masonry units.
- I. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C1714/C1714M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Color: Mineral pigments added as required to produce approved color sample to match existing mortar.
- J. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.

2.04 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
 - 1. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - 2. Heckmann Building Products, Inc.
 - 3. WIRE-BOND: www.wirebond.com/#sle.
 - 4. Or approved equal.
- B. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi), deformed billet bars; galvanized.
- C. Joint Reinforcement: Use ladder type joint reinforcement where vertical reinforcement is involved and truss type elsewhere, unless otherwise indicated.
- D. Single Wythe Joint Reinforcement: ASTM A951/A951M.
 - 1. Type: Truss or ladder.
 - 2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to 16 CFR 1201 Class B.
 - 3. Size: 0.1875 inch side rods with 0.1875 inch cross rods; width as required to provide not less than 5/8 inch of mortar coverage on each exposure.
- E. Adjustable Multiple Wythe Joint Reinforcement: ASTM A951/A951M.
 - 1. Type: Ladder, with adjustable ties or tabs spaced at 16 in on center.
 - 2. Material: ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to ASTM A153/A153M Class B.
 - 3. Size: 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire, width of components as required to provide not less than 5/8 inch of mortar coverage from each masonry face.
 - 4. Vertical adjustment: Not more than 1 1/4 inches.
 - 5. Insulation Clips: Provide clips at tabs or ties designed to secure insulation against outer face of inner wythe of masonry.
- F. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.

1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners.
2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
3. Vertical adjustment: Not less than 2 inches.

2.05 FLASHINGS

- A. Metal Flashing Materials:
 1. Stainless Steel Flashing: ASTM A666, Type 304, soft temper; 26 gauge, 0.0187 inch thick; finish 2B to 2D.
- B. Combination Non-Asphaltic Flashing Materials - Stainless Steel:
 1. Stainless Steel/Polymer Fabric Flashing: ASTM A240/A240M; 2 mil type 304 stainless steel sheet bonded on one side to one sheet of polymer fabric.
 - a. Manufacturers:
 - 1) Hohmann & Barnard, Inc; Mighty-Flash Stainless Flashing: www.h-b.com/#sle.
 - 2) York Manufacturing, Inc; Multi-Flash SS: www.yorkmfg.com/#sle.
- C. Factory-Fabricated Flashing Corners and End Dams: Stainless steel.
- D. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

2.06 ACCESSORIES

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
- B. Building Paper: ASTM D226/D226M, Type I ("No.15") asphalt felt.
- C. Connection Components: ASTM A36 Steel, galvanized.
- D. Weeps:
 1. Type: Preformed aluminum vents with sloping louvers.
 2. Color(s): As selected by Architect from manufacturer's full range.
 3. Manufacturers:
 - a. Blok-Lok Limited: www.blok-lok.com/#sle.
 - b. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - c. WIRE-BOND: www.wirebond.com/#sle.
 - d. Or approved equal.
- E. Cavity Vents:
 1. Type: Preformed aluminum vents with sloping louvers.
 2. Color(s): As selected by Architect from manufacturer's full range.
 3. Manufacturers:
 - a. Blok-Lok Limited: www.blok-lok.com/#sle.
 - b. Hohmann & Barnard, Inc: www.h-b.com/#sle.
 - c. WIRE-BOND: www.wirebond.com/#sle.
 - d. Or approved equal.
- F. Drainage Fabric: Polyester or polypropylene mesh bonded to a water and vapor-permeable fabric.
 1. Manufacturers:
 - a. Mortar Net Solutions: www.mortarnet.com/#sle.
 - b. Or approved equal.
- G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.07 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Property Specification.
 1. Masonry below grade and in contact with earth: Type S.
 2. Exterior, loadbearing masonry: Type S.
 3. Exterior, non-loadbearing masonry: Type N.

4. Interior, loadbearing masonry: Type S.
 5. Interior, non-loadbearing masonry: Type N.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. Grout: ASTM C476; consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.
- D. Admixtures: Add to mixture at manufacturer's recommended rate and in accordance with manufacturer's instructions; mix uniformly.
- E. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COLD AND HOT WEATHER REQUIREMENTS

- A. Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

3.04 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
1. Bond: Running.
 2. Coursing: One unit and one mortar joint to equal 8 inches.
 3. Mortar Joints: Concave.
- D. Brick Units:
1. Bond: Running.
 2. Coursing: Three units and three mortar joints to equal 8 inches.
 3. Mortar Joints: Concave.

3.05 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Remove excess mortar with water repellent admixture promptly. Do not use acids, sandblasting or high pressure cleaning methods.
- F. Interlock intersections and external corners.
- G. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- H. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

- I. Cut mortar joints flush where resilient base is scheduled.
- J. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- K. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.06 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install cavity vents in veneer and cavity walls at 32 inches on center horizontally below shelf angles and lintels and near top of walls.

3.07 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

3.08 REINFORCEMENT AND ANCHORAGE - GENERAL, SINGLE WYTHER MASONRY, AND CAVITY WALL MASONRY

- A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
- C. Place continuous joint reinforcement in first and second joint below top of walls.
- D. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.
- E. Lap joint reinforcement ends minimum 6 inches.
- F. Embed ties and anchors in mortar joint and extend into masonry unit a minimum of 1-1/2 inches with at least 5/8 inch mortar cover to the outside face of the anchor.

3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

- A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 36 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.
- B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 24 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

3.10 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up flashing ends at least 1 inch, minimum, to form watertight pan at nonmasonry construction.
 - 2. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Terminate flashing up 8 inches minimum on vertical surface of backing:
- C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.
- D. Extend metal flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.

- E. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

3.11 LINTELS

- A. Install loose steel lintels over openings.
- B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.

3.12 GROUTED COMPONENTS

- A. Reinforce bond beams with 2, No. 5 bars, 1 inch from bottom web.
- B. Lap splices minimum 24 bar diameters.
- C. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
- D. Place and consolidate grout fill without displacing reinforcing.
- E. At bearing locations, fill masonry cores with grout for a minimum 12 inches either side of opening.

3.13 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.

3.14 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and glazed frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.15 TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- F. Maximum Variation of Mortar Joint Thickness: Head joint, minus 1/8 inch, plus 1/8 inch.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.16 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.17 FIELD QUALITY CONTROL

- A. Mortar Tests: Test each type of mortar in accordance with ASTM C780, testing with same frequency as masonry samples.

3.18 CLEANING

- A. Remove excess mortar and mortar droppings.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.19 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION

**SECTION 047200
CAST STONE MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Architectural cast stone.

1.02 RELATED REQUIREMENTS

- A. Section 042000 - Unit Masonry: Installation of cast stone in conjunction with masonry.
- B. Section 079200 - Joint Sealants: Sealing joints indicated to be left open for sealant.

1.03 REFERENCE STANDARDS

- A. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
- C. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
- D. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
- E. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
- F. ASTM C33/C33M - Standard Specification for Concrete Aggregates.
- G. ASTM C150/C150M - Standard Specification for Portland Cement.
- H. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
- I. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
- J. ASTM C1364 - Standard Specification for Architectural Cast Stone.

1.04 SUBMITTALS

- A. Product Data: Test results of cast stone components made previously by the manufacturer.
- B. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.
- C. Verification Samples: Pieces of actual cast stone components not less than 6 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.

- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. A firm with a minimum of 5 years experience producing cast stone of types required for project.
 - 2. Current producer member of the Cast Stone Institute or the Architectural Precast Association.
 - 3. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.
- B. Number each piece individually to match shop drawings and schedule.
- C. Store cast stone components and installation materials in accordance with manufacturer's instructions.
- D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.
- E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.
- F. Store mortar materials where contamination can be avoided.
- G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Cast Stone:
 - 1. Any current producer member of the Architectural Precast Association.
 - 2. Any current producer member of the Cast Stone Institute.

2.02 ARCHITECTURAL CAST STONE

- A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural granite, complying with ASTM C1364.
 - 1. Compressive Strength: As specified in ASTM C1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
 - 2. Freeze-Thaw Resistance: Demonstrated by laboratory testing in accordance with ASTM C1364.
 - 3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.
 - 4. Color: Selected by Architect from manufacturer's full range.
 - 5. Remove cement film from exposed surfaces before packaging for shipment.

- B. Shapes: Provide shapes indicated on drawings.
 - 1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
 - 2. Unless otherwise indicated on drawings, provide:
 - a. Wash or slope of 1:12 on exterior horizontal surfaces.
 - b. Drips on projecting components, wherever possible.
 - c. Raised fillets at back of sills and at ends to be built in.
- C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.

2.03 MATERIALS

- A. Portland Cement: ASTM C150/C150M.
 - 1. For Mortar: Type I or II, except Type III may be used in cold weather.
- B. Coarse Aggregate: ASTM C33/C33M, except for gradation; granite, quartz, or limestone.
- C. Fine Aggregate: ASTM C33/C33M, except for gradation; natural or manufactured sands.
- D. Admixtures: ASTM C494/C494M.
- E. Water: Potable.
- F. Reinforcing Bars: ASTM A615/A615M, Grade 40 (40,000 psi), deformed bars, galvanized.
 - 1. Galvanized in accordance with ASTM A767/A767M, Class I.
- G. Steel Welded Wire Reinforcement: ASTM A1064/A1064M, galvanized or ASTM A884/A884M, epoxy coated.
- H. Embedded Anchors, Dowels, and Inserts: Type 304 stainless steel, of type and size as required for conditions.
- I. Mortar: Portland cement-lime, ASTM C270 Type N; do not use masonry cement.
- J. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.
- B. Do not begin installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install cast stone components in conjunction with masonry, complying with requirements of Section 042000.
- C. Mechanically anchor cast stone units indicated; set remainder in mortar.
- D. Setting:
 - 1. Drench cast stone components with clear, running water immediately before installation.
 - 2. Set units in a full bed of mortar unless otherwise indicated.
 - 3. Fill vertical joints with mortar.
 - 4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

3.03 TOLERANCES

- A. Joints: Make all joints 3/8 inch, except as otherwise detailed.
 - 1. Rake mortar joints 3/4 inch for pointing.

2. Remove excess mortar from face of stone before pointing joints.
 3. Point joints with mortar in layers 3/8 inch thick and tool to a slight concave profile.
 4. Leave the following joints open for sealant:
 - a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
 - b. Joints in projecting units.
 - c. Joints between rigidly anchored units, including soffits, panels, and column covers.
 - d. Joints below lugged sills and stair treads.
 - e. Joints below ledge and relieving angles.
 - f. Joints labeled "expansion joint".
- B. Installation Tolerances:
1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
 2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
 3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
 4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.04 REPAIR

- A. Repair chips and other surface damage noticeable when viewed in direct daylight at 10 feet.
- B. Repair with matching touch-up material provided by the manufacturer and in accordance with manufacturer's instructions.
- C. Repair methods and results subject to Architect 's approval.

3.05 CLEANING

- A. Clean completed exposed cast stone after mortar is thoroughly set and cured.
 1. Wet surfaces with water before applying cleaner.
 2. Apply cleaner to cast stone in accordance with manufacturer's instructions.
 3. Remove cleaner promptly by rinsing thoroughly with clear water.
 4. Do not use acidic cleaners.

3.06 PROTECTION

- A. Protect completed work from damage.
- B. Clean, repair, or restore damaged or mortar-splashed work to condition of new work.

END OF SECTION

**SECTION 051200
STRUCTURAL STEEL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Structural steel framing members.
- B. Base plates, shear stud connectors and expansion joint plates.
- C. Grouting under base plates.

1.02 RELATED REQUIREMENTS

- A. Section 053100 - Steel Decking: Support framing for small openings in deck.

1.03 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual 2017.
- B. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges 2022.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.
- F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2021.
- G. ASTM A563/A563M - Standard Specification for Carbon and Alloy Steel Nuts (Inch and Metric) 2021a.
- H. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel 2021, with Editorial Revision.
- I. ASTM A992/A992M - Standard Specification for Structural Steel Shapes 2022.
- J. ASTM F436/F436M - Standard Specification for Hardened Steel Washers Inch and Metric Dimensions 2019.
- K. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength 2020.
- L. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2022.
- M. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2020.
- N. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- O. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- P. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel AC172 2019.
- Q. RCSC (HSBOLT) - Specification for Structural Joints Using High-Strength Bolts; Research Council on Structural Connections 2020.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 - 2. Connections not detailed.
 - 3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

- C. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC (MAN) "Steel Construction Manual."
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.
- C. Fabricator Qualifications: A qualified steel fabricator that is accredited by the International Accreditation Service (IAS) Fabricator Inspection Program for Structural Steel in accordance with IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Angles and Plates: ASTM A36/A36M.
- B. Steel W Shapes and Tees: ASTM A992/A992M.
- C. Rolled Steel Structural Shapes: ASTM A992/A992M.
- D. High-Strength Structural Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, with matching compatible ASTM A563/A563M nuts and ASTM F436/F436M washers.
- E. Headed Anchor Rods: ASTM F1554 Grade 36, plain.
- F. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- G. Grout: ASTM C1107/C1107M; Non-shrink; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
 - 1. Minimum Compressive Strength at 48 Hours: 2,000 pounds per square inch.
 - 2. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch.
- H. Shop and Touch-Up Primer: Fabricator's standard, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Shop fabricate to greatest extent possible.

2.03 FINISH

- A. Galvanize structural steel members to comply with ASTM A123/A123M. Provide minimum 1.7 oz/sq ft galvanized coating.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC 303.
- B. Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.

END OF SECTION

**SECTION 053100
STEEL DECKING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof deck.
- B. Supplementary framing for openings up to and including 18 inches.
- C. Bearing plates and angles.

1.02 RELATED REQUIREMENTS

- A. Section 032000 - Concrete Reinforcing.
- B. Section 033000 - Cast-in-Place Concrete: Concrete topping over metal deck.
- C. Section 034100 - Precast Structural Concrete: Placement of embedded steel anchors, dovetail slots, bearing plates, joist seats and other steel connectors in precast concrete.
- D. Section 042000 - Unit Masonry: Placement of anchors for bearing plates embedded in unit masonry assemblies.
- E. Section 051200 - Structural Steel Framing: Support framing for openings larger than 18 inches and shear stud connectors.
- F. Section 051200 - Structural Steel Framing: Placement of embedded steel anchors for bearing plates in cast-in-place concrete.

1.03 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- D. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2021.
- E. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- F. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018, with Errata (2022).
- G. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components 2016, with Editorial Revision (2022).
- H. SDI (DM) - Publication No.30, Design Manual for Composite Decks, Form Decks, and Roof Decks 2007.
- I. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic) 2019.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittals procedures.
- B. Product Data: Provide deck profile characteristics, dimensions, structural properties, and finishes.
- C. Shop Drawings: Indicate deck plan, support locations, projections, openings, reinforcement, pertinent details, and accessories.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the

project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 2. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - a. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - b. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Cut plastic wrap to encourage ventilation.
- B. Separate sheets and store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Steel Deck:
 1. Canam Steel Corporation: www.canam-steeljoists.ws.
 2. Cordeck, Inc: www.cordeck.com/#sle.
 3. Nucor-Vulcraft Group: www.vulcraft.com/#sle.
 4. Substitutions: See Section 016000 - Product Requirements.

2.02 STEEL DECK

- A. Roof Deck: Non-composite type, fluted steel sheet:
 1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS) Grade 33/230, with G90/Z275 galvanized coating.
 2. Minimum Base Metal Thickness: 22 gauge, 0.0299 inch.
 3. Formed Sheet Width: 24 inch.
 4. End Joints: Lapped, welded.

2.03 ACCESSORY MATERIALS

- A. Bearing Plates and Angles: ASTM A36/A36M steel, galvanized per ASTM A123/A123M.
- B. Welding Materials: AWS D1.1/D1.1M.
- C. Fasteners: Galvanized hardened steel, self tapping.
- D. Mechanical Fasteners: Steel; hex washer head, self-drilling, self-tapping.
- E. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, complying with VOC limitations of authorities having jurisdiction.

2.04 FABRICATED DECK ACCESSORIES

- A. Sheet Metal Deck Accessories: Metal closure strips, wet concrete stops, and cover plates, 22 gauge, 0.0299 inch thick sheet steel; of profile and size as indicated; finished same as deck.
- B. Cant Strips: Formed sheet steel, ___ gauge, ___ inch minimum thickness, 45 degree slope, 3-1/2 inch nominal width and height, flange for attachment.

- C. Roof Sump Pans: Formed sheet steel, 14 gauge, 0.0747 inch minimum thickness, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions prior to beginning work.

3.02 INSTALLATION

- A. Erect metal deck in accordance with SDI Design Manual and manufacturer's instructions. Align and level.
- B. On concrete and masonry surfaces provide minimum 4 inch bearing.
- C. On steel supports provide minimum 1-1/2 inch bearing.
- D. Fasten deck to steel support members at ends and intermediate supports at 12 inches on center maximum, parallel with the deck flute and at each transverse flute using methods specified.
 - 1. Welding: Use fusion welds through weld washers.
- E. At mechanically fastened male/female side laps fasten at 24 inches on center maximum.
- F. Drive mechanical sidelap connectors completely through adjacent lapped sheets; positively engage adjacent sheets with minimum three-thread penetration.
- G. Weld deck in accordance with AWS D1.3/D1.3M.
- H. At deck openings from 6 inches to 18 inches in size, provide 2 by 2 by 1/4 inch steel angle reinforcement. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and fusion weld to deck at each flute.
- I. At deck openings greater than 18 inches in size, provide steel angle reinforcement. as specified in Section 051200.
- J. Place metal cant strips in position and fusion weld.
- K. Position roof drain pans with flange bearing on top surface of deck. Fusion weld at each deck flute.
- L. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up primer.

END OF SECTION

**SECTION 054000
COLD-FORMED METAL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Formed steel stud exterior wall framing.
- B. Formed steel joist and purlin framing and bridging.
- C. Water-resistive barrier over sheathing.

1.02 RELATED REQUIREMENTS

- A. Section 053100 - Steel Decking.

1.03 REFERENCE STANDARDS

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members 2016, with Supplement (2020).
- B. AISI S201 - North American Standard for Cold-Formed Steel Framing - Product Data 2017.
- C. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing 2015, with Errata (2020).
- D. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- E. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings 2020.
- F. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members 2015.
- G. AWS D1.3/D1.3M - Structural Welding Code - Sheet Steel 2018, with Errata (2022).
- H. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on cold-formed steel structural members; include material descriptions and base steel thickness.
- C. Shop Drawings: Indicate component details, framed openings, bearing, anchorage, loading, welds, and type and location of fasteners, and accessories or items required of related work.
 - 1. Indicate stud and ceiling joist layout.
 - 2. Describe method for securing studs to tracks and for bolted framing connections.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including

those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.

- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Structural Framing:
 - 1. CEMCO; _____: www.cemcosteel.com/#sle.
 - 2. ClarkDietrich; _____: www.clarkdietrich.com/#sle.
 - 3. Jaimes Industries; _____: www.jaimesind.com/#sle.
 - 4. MarinoWARE; _____: www.marinoware.com/#sle.
 - 5. SCAFCO Corporation; _____: www.scafco.com/#sle.
 - 6. Steel Construction Systems; _____: www.steelconsystems.com/#sle.
 - 7. The Steel Network, Inc; _____: www.SteelNetwork.com/#sle.
 - 8. Substitutions: See Section 016000 - Product Requirements.
- B. Connectors:
 - 1. ClarkDietrich; _____: www.clarkdietrich.com/#sle.
 - 2. MarinoWARE; _____: www.marinoware.com/#sle.
 - 3. Simpson Strong-Tie; _____: www.strongtie.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

- A. Design Requirements: Design cold-formed framing systems, components and connectors to withstand specified design loads in compliance with ICC (IBC), ASCE 7, AISI S100, and AISI S240.
- B. Design Criteria: As indicated on the drawings.
 - 1. Live load deflection meeting the following, unless otherwise indicated:
 - a. Roofs: Maximum vertical deflection under live load of 1/240 of span.
 - b. Exterior Walls: Maximum horizontal deflection under wind load of 1/180 of span.
 - c. Design nonaxial loadbearing framing to accommodate not less than 1/2 in vertical deflection.
 - 2. Able to tolerate movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 3. Able to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

2.03 MATERIALS

- A. Material and Product Requirements Criteria: AISI S201.
- B. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
 - 1. Structural Grade: As required to meet design criteria.
 - 2. Corrosion Protection Coating Designation: CP 90 in accordance with AISI S240.

2.04 STRUCTURAL FRAMING COMPONENTS

2.05 CONNECTIONS

- A. Performance Requirements: Provide connections in compliance with requirements of AISI S240.

2.06 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered; finish to match framing components.
- B. Galvanizing Repair: Touch up bare steel with zinc-rich paint in compliance with ASTM A780/A780M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.
- B. Verify field measurements and adjust installation as required.

3.02 INSTALLATION - GENERAL

- A. Install structural members and connections in compliance with AISI S240.

END OF SECTION

**SECTION 055000
METAL FABRICATIONS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shop fabricated steel and aluminum items.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- D. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
- E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- I. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- K. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.
- L. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic).
- M. SSPC-SP 2 - Hand Tool Cleaning.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.

- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M Grade B Schedule 80, black and hot-dip galvanized finish, as indicated.
- E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.
- F. Slotted Channel Fittings: ASTM A1011/A1011M.
- G. Mechanical Fasteners: Same material as or compatible with materials being fastened; type consistent with design and specified quality level.
- H. Bolts, Nuts, and Washers: ASTM A307, Grade A, plain.
- I. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- J. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- K. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Furnish components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED ITEMS

- A. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; galvanized finish.
- B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of masonry; galvanized finish.
- C. Lintels: As detailed; galvanized finish.
- D. Elevator Hoistway Divider Beams: Beam sections; prime paint finish.
- E. Slotted Channel Framing: Fabricate channels and fittings from structural steel complying with the referenced standards; factory-applied, rust-inhibiting thermoset acrylic enamel finish.

2.04 FINISHES - STEEL

- A. Shop Primer for Ferrous Metal:
 - 1. Interior Exposure: Series 88HS Tnemec Primer as manufactured by Tnemec Company, Inc. or equivalent.
 - 2. Exterior Exposure: Series 0-97 Tnemec-Zinc Urethane zinc rich primer applied to a DFT of 3.0 to 4.0 mils as manufactured by Tnemec Company, Inc. or equivalent.
- B. Prime paint steel items.
 - 1. Exceptions: Galvanize items to be embedded in concrete and items to be embedded in masonry.
 - 2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.
- C. Prepare surfaces to be primed in accordance with SSPC-SP2.
- D. Prime Painting: One coat.
- E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.05 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Furnish setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Perform field welding in accordance with AWS D1.1/D1.1M.
- D. Obtain approval prior to site cutting or making adjustments not scheduled.
- E. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION

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**SECTION 057000
DECORATIVE METAL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Railing and guardrail assemblies.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- D. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes.
- E. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- H. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.
- I. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength.
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- K. AWS D1.6/D1.6M - Structural Welding Code - Stainless Steel.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product data, including description of materials, components, finishes, fabrication details, glass, anchors, and accessories.
- B. Shop Drawings: Indicate railing system elevations and sections, details of profile, dimensions, sizes, connection attachments, anchorage, size and type of fasteners, and accessories. Indicate anchor and joint locations, brazed connections, transitions, and terminations.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.

- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in factory-provided protective coverings and packaging.
- B. Protect materials against damage during transit, delivery, storage, and installation at site.
- C. Inspect materials upon delivery for damage. Repair damage to be indistinguishable from undamaged areas; if damage cannot be repaired to be indistinguishable from undamaged parts and finishes, replace damaged items.
- D. Prior to installation, store materials and components under cover in a dry location.

1.06 FIELD CONDITIONS

- A. Do not install railings until project is enclosed and ambient temperature of space is minimum 65 degrees F and maximum 95 degrees F.
- B. Maintain ambient temperature of space at minimum 65 degrees F and maximum 95 degrees F for 24 hours before, during, and after railing installation.

PART 2 PRODUCTS

2.01 RAILING SYSTEMS

- A. Railing Systems - General: Factory- or shop-fabricated in design indicated, to suit specific project conditions, and for proper connection to building structure, and in largest practical sizes for delivery to site.
 - 1. Performance Requirements: Design and fabricate railings and anchorages to resist the following loads without failure, damage, or permanent set; loads do not need to be applied simultaneously.
 - a. Lateral Force: 75 lb minimum, at any point, when tested in accordance with ASTM E935.
 - b. Distributed Load: 50 lb/ft minimum, applied in any direction at the top of the handrail, when tested in accordance with ASTM E935.
 - c. Concentrated Loads on Intermediate Rails: 50 psf, minimum.
 - d. Concentrated Load: 200 lbs minimum, applied in any direction at any point along the handrail system, when tested in accordance with ASTM E935.
 - 2. Assembly: Join lengths, seal open ends, and conceal exposed mounting bolts and nuts using slip-on non-weld mechanical fittings, flanges, escutcheons, and wall brackets.
 - 3. Joints: Tightly fitted and secured, machined smooth with hairline seams.
 - 4. Field Connections: Provide sleeves to accommodate site assembly and installation.
 - 5. Welded and Brazed Joints: Make visible joints butt tight, flush, and hairline; use methods that avoid discoloration and damage of finish; grind smooth, polish, and restore to required finish.
 - a. Ease exposed edges to a small uniform radius.
 - b. Welded Joints:
 - 1) Carbon Steel: Perform welding in accordance with AWS D1.1/D1.1M.
 - 2) Stainless Steel: Perform welding in accordance with AWS D1.6/D1.6M.
- B. Metal Railing: Engineered, post-supported railing system with metal infill.

1. Decorative Flanges for Embedded Posts: Circular, collared cover plate without screw holes.
2. Wall Mounted Components: Components necessary to support railing with 1-1/2 inch clearance from wall, and as follows:
3. Handrail Brackets: Same metal as railing.
4. Fasteners: Concealed.
5. Infill at Cable Railings: Stainless steel cable.
 - a. Material: ASTM A666, Type 304.
 - b. Mounting: Mechanically attached to frame.
6. End and Intermediate Posts: As shown on drawings.
 - a. Horizontal Spacing: As indicated on drawings.
 - b. Mounting: Welded.

2.02 MATERIALS

- A. Steel Components:
 1. Sections, Shapes, Plate and Bar: ASTM A36/A36M.
 2. Tubing: ASTM A501/A501M structural tubing, round and shapes as indicated.
 3. Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.
 4. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
 5. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- B. Stainless Steel Components:
 1. ASTM A666, Type 304.
 2. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.
 3. Stainless Steel Finish: No. 4 Bright Polished finish.

2.03 ACCESSORIES

- A. Welding Fittings: Factory- or shop-welded from matching pipe or tube; joints and seams ground smooth.
- B. Anchors and Fasteners: Provide anchors and other materials as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 1. For anchorage to concrete, provide inserts to be cast into concrete for bolt anchors.
 2. For anchorage to masonry, provide brackets to be embedded in masonry for bolt anchors.
 3. For anchorage to stud walls, provide backing plates for bolt anchors.
 4. Exposed Fasteners: No exposed bolts or screws.
- C. Carbon Steel Bolts and Nuts: ASTM A307.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate and site conditions are acceptable and ready to receive work.
- B. Verify field dimensions of locations and areas to receive work.
- C. Notify Architect immediately of conditions that would prevent satisfactory installation.
- D. Do not proceed with work until detrimental conditions have been corrected.
- E. Furnish components to be installed in other work to installer of that other work, including but not limited to blocking, sleeves, inserts, anchor bolts, embedded plates, and supports for attachment of anchors.

3.02 PREPARATION

- A. Review installation drawings before beginning installation. Coordinate diagrams, templates, instructions, and directions for installation of anchorages and fasteners.

- B. Clean surfaces to receive units. Remove materials and substances detrimental to the installation.

3.03 INSTALLATION

- A. Comply with manufacturer's drawings and written instructions.
- B. Install components plumb and level, accurately fitted, free from distortion or defects, and with tight joints, except where necessary for expansion.
- C. Anchor securely to structure.
- D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- E. Isolate dissimilar materials with bituminous coating, bushings, grommets, or washers to prevent electrolytic corrosion.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

3.05 CLEANING

- A. Remove protective film from exposed metal surfaces.
- B. Metal: Clean exposed metal finishes with potable water and mild detergent, in accordance with manufacturer recommendations; do not use abrasive materials or chemicals, detergents, or other substances that may damage the material or finish.

3.06 PROTECTION

- A. Protect installed components and finishes from damage after installation.
- B. Repair damage to exposed finishes to be indistinguishable from undamaged areas.
 - 1. If damage to finishes and components cannot be repaired to be indistinguishable from undamaged finishes and components, replace damaged items.

END OF SECTION

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**SECTION 061000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sheathing.
- B. Roof-mounted curbs.
- C. Roofing nailers.
- D. Preservative treated wood materials.
- E. Fire retardant treated wood materials.
- F. Communications and electrical room mounting boards.
- G. Concealed wood blocking, nailers, and supports.

1.02 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- B. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
- C. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- D. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- E. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing.
- F. AWPA U1 - Use Category System: User Specification for Treated Wood.
- G. PS 1 - Structural Plywood.
- H. PS 20 - American Softwood Lumber Standard.
- I. SPIB (GR) - Standard Grading Rules.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials and sheathing.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.

- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Roofing Wood Nailers: Wood Nailers shall be secured in accordance with FM Global Property Loss Prevention Data Sheet 1-49.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, and installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. If no species is specified, provide species graded by the agency specified; if no grading agency is specified, provide lumber graded by grading agency meeting the specified requirements.
 - 2. Grading Agency: Grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee at www.alsc.org, and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 CONSTRUCTION PANELS

- A. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, 5/8 inch Type X fire resistant.
 - 1. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - 2. Edges: Square.
 - 3. Products:
 - a. CertainTeed Corporation; GlasRoc Brand: www.certainteed.com/#sle.
 - b. Georgia-Pacific Gypsum; DensGlass Sheathing: www.gpgypsum.com/#sle.
 - c. Gold Bond Building Products, LLC provided by National Gypsum Company; Gold Bond eXP Fire-Shield Sheathing: www.goldbondbuilding.com/#sle.
 - d. USG Corporation; Securock Brand UltraLight Glass-Mat Sheathing Firecode USGX 5/8 in. (15.9 mm): www.usg.com/#sle.

- B. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- C. Other Applications:
 - 1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
 - 2. Plywood Exposed to View But Not Exposed to Weather: PS 1, A-D, or better.
 - 3. Other Locations: PS 1, C-D Plugged or better.

2.04 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
- B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.
- C. General Purpose Construction Adhesives: Comply with ASTM C557.

2.05 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWWA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
 - 2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWWA standards.
- B. Fire Retardant Treatment:
 - 1. Interior Type A: AWWA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
 - a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
 - b. Treat rough carpentry items as indicated .
 - c. Do not use treated wood in applications exposed to weather or where the wood may become wet.
- C. Preservative Treatment:
 - 1. Preservative Pressure Treatment of Lumber Above Grade: AWWA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
 - a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
 - b. Treat lumber in contact with flashing or waterproofing.
 - c. Treat lumber in contact with masonry or concrete.
 - d. Treat lumber in other locations as indicated.
 - 2. Preservative Pressure Treatment of Plywood Above Grade: AWWA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative.
 - a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
 - b. Treat plywood in contact with flashing or waterproofing.
 - c. Treat plywood in contact with masonry or concrete.
 - d. Treat plywood in other locations as indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

3.02 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.03 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to authorities having jurisdiction may be used in lieu of solid wood blocking.
- C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
- D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.04 ROOF-RELATED CARPENTRY

- A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.
- B. Provide wood curb at each roof opening except where specifically indicated otherwise; form corners by alternating lapping side members.

3.05 INSTALLATION OF CONSTRUCTION PANELS

- A. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using screws.
- B. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.
 - 1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
 - 2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
 - 3. Install adjacent boards without gaps.

3.06 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane, Other than Floors: 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

END OF SECTION

**SECTION 071113
BITUMINOUS DAMPPROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Bituminous dampproofing.

1.02 REFERENCE STANDARDS

- A. ASTM D4479/D4479M - Standard Specification for Asphalt Roof Coatings - Asbestos-Free.
- B. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
- C. NRCA (WM) - The NRCA Waterproofing Manual.

1.03 SUBMITTALS

- A. Product Data: Provide properties of primer, bitumen, and mastics.

1.04 SUSTAINABLE DESIGN SUBMITTALS

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 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 FIELD CONDITIONS

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Bituminous Dampproofing Manufacturers:
 - 1. Karnak Corporation: www.karnakcorp.com/#sle.
 - 2. Mar-flex Waterproofing & Building Products: www.mar-flex.com/#sle.
 - 3. W. R. Meadows, Inc: www.wrmeadows.com/#sle.

2.02 BITUMINOUS DAMPPROOFING

- A. Bituminous Dampproofing: Cold-applied, spray-grade; asphalt base, volatile petroleum solvents, and other content, suitable for application by spray, brush, roller, or squeegee; asbestos-free; suitable for application on vertical and horizontal surfaces.
 - 1. Composition: ASTM D4479/D4479M Type I, asbestos free.

2. VOC Content: Not more than permitted by local, State, and federal regulations.
 3. Applied Thickness: 1/16 inch, minimum, wet film.
- B. Bituminous Dampproofing: Cold-applied, trowel-grade; asphalt base, volatile petroleum solvents, and other content, suitable for application by trowel on vertical and horizontal surfaces.
1. Composition: ASTM D4586/D4586M Type I, asbestos free.
 2. VOC Content: Not more than permitted by local, State, and federal regulations.
 3. Applied Thickness: 1/16 inch, minimum, wet film.
- C. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
- C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

3.02 PREPARATION

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

3.03 APPLICATION

- A. Masonry Walls Below Grade: Apply two coats of asphalt dampproofing.
- B. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- C. Prime surfaces in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- D. Seal items watertight with mastic, that project through dampproofing surface.

END OF SECTION

**SECTION 071800
TRAFFIC COATINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Waterproof coatings for traffic surfaces.

1.02 REFERENCE STANDARDS

- A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers--Tension 2016 (Reapproved 2021).
- B. ASTM D638 - Standard Test Method for Tensile Properties of Plastics 2022.
- C. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds 1998 (Reapproved 2017).
- D. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).
- E. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness 2015 (Reapproved 2021).
- F. ASTM D4060 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser 2019.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- H. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2022.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Include product characteristics and limitations. Identify dissolving solvents, fuels, and potential destructive compounds.
- C. Manufacturer's Installation Instructions: Include special field conditions required to install traffic membrane and potential incompatibilities with adjacent materials.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
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- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.

- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

- 1. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Maintain storage area at minimum ambient temperature of 55 degrees F.
- B. Keep away from fire or open flame.

1.06 FIELD CONDITIONS

- A. Do not install materials when temperature is below 50 degrees F or above 90 degrees F.
- B. Maintain this temperature range, 24 hours before, during and 72 hours after application.
- C. Restrict traffic from area where materials are being installed or are curing.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for delamination of system from substrate and degradation of waterproofing ability. Complete forms in Owner's name and register with manufacturer.
- C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 TRAFFIC COATINGS

- A. Traffic Decking Waterproof Coating System: Modified polyurethane system with base coat, intermediate coat, and top coat.
 - 1. Finished Coating Thickness: 49 mil, 0.049 inch, minimum.
 - 2. Color: Gray.
 - 3. Products:
 - a. Master Builders Solutions; MasterSeal Traffic 2500: www.master-builders-solutions.com/en-us/#sle.
 - b. Tremco Commercial Sealants & Waterproofing; Vulkem 350NF/950NF/951NF: www.tremcosealants.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.

2.02 ACCESSORIES

- A. Cant Strips: 1 inch by 1 inch by 45 degrees, of dense sponge rubber compatible with adjacent materials.
- B. Sealant: As recommended by membrane manufacturer, and compatible with system and adjacent materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate is ready to receive work, surface is clean, dry and free of substances that could adversely effect bond.
- B. Do not begin work until concrete substrate has cured at least 28 days and moisture content is 16 percent or less.
- C. Test concrete surfaces according to ASTM F710 for acceptable level of alkalinity.

3.02 PREPARATION

- A. Clean substrate surface free of foreign matter.
- B. Patch concrete substrate with filler to produce surface conducive to bond.

- C. Install cant strips securely at intersecting surfaces.
- D. Protect adjacent surfaces.

3.03 INSTALLATION

- A. Apply system materials in accordance with manufacturer's instructions.
- B. Finish to smooth surface sloped to drains. Cove at vertical surfaces.
- C. Apply sealant to junction of horizontal and intersecting surfaces to achieve watertight seal.

3.04 PROTECTION

- A. Do not permit traffic over unprotected surfaces.

END OF SECTION

**SECTION 071900
WATER REPELLENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water repellents to be applied top surface of concrete slab surfaces, all sides of concrete barrier walls, exterior slab edges, stairs, exterior faces of CMU walls, 6" up column faces of the parking garage
- B. Pressure washing.

1.02 REFERENCE STANDARDS

- A. ASTM C140/C140M - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units 2022c.
- B. ASTM C642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete 2021.
- C. ASTM D3960 - Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings 2005 (Reapproved 2018).
- D. ASTM D5095 - Standard Test Method for Determination of the Nonvolatile Content in Silanes, Siloxanes and Silane-Siloxane Blends Used in Masonry Water Repellent Treatments 1991 (Reapproved 2022).

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, details of tests performed, limitations and chemical composition
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.

1.04 SUSTAINABLE DESIGN SUBMITTALS

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 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience

1.06 FIELD CONDITIONS

- A. Protect liquid materials from freezing.
- B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Silane, Siloxane, Silane-Siloxane Blend, and Siliconate Water Repellents:
 - 1. BASF Construction Chemicals; Hydrozo 100: www.buildingsystems.basf.com/#sle.
 - 2. Dayton Superior Corporation; Weather Worker 100%: www.daytonsuperior.com/#sle.
 - 3. Pecora Corporation; Klere Seal 9100-S: www.pecora.com/#sle.
 - 4. Euclid Chemical; Baracade Silane 100
 - 5. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.
 - 1. Applications: Vertical surfaces and non-traffic horizontal surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify joint sealants are installed and cured.
- C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

3.02 PREPARATION

- A. Apply waer repellant after pavement striping. Contractor to coordinate.
- B. Protection of Adjacent Work:
 - 1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
 - 2. Protect adjacent surfaces not intended to receive water repellent.
- C. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.
- D. Remove loose particles and foreign matter.
- E. Remove oil and foreign substances with a chemical solvent that will not affect water repellent.
- F. Scrub and rinse surfaces with water and let dry.
- G. Pressure wash surfaces to be coated.
 - 1. Concrete: High pressure wash at 1,500 to 4,000 psi, at 6 to 12 inches from surface.

3.03 APPLICATION

- A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.

- B. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

END OF SECTION

**SECTION 072100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at cavity wall construction, perimeter foundation wall, underside of floor slabs, and exterior wall behind exterior wall finish.
- B. Spray foam insulation.

1.02 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- E. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials.
- F. ASTM E2357 - Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies.
- G. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components.

1.03 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

1.04 SUSTAINABLE DESIGN SUBMITTALS

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 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
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1.05 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Under Concrete Slabs: Extruded polystyrene (XPS) board.
- B. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- C. Insulation Over Exterior Walls, Continuous: Polyisocyanurate or Thermoset Phenolic board.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Extruded Polystyrene (XPS) Board Insulation: Comply with ASTM C578 with either natural skin or cut cell surfaces.
 - 1. Type and Compressive Resistance: Type VI, 40 psi (276 kPa), minimum.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 4. Type and Thermal Resistance, R-value: Type VI, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
 - 5. Board Edges: Square.
 - 6. Products:
 - a. Certainteed Corp.
 - b. DuPont de Nemours, Inc: building.dupont.com/#sle.
 - c. Johns Manville Corp.
 - d. Kingspan Insulation LLC: www.kingspan.com/#sle.
 - e. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
- B. Rigid Thermoset Board Insulation: Fiber-free phenolic insulation with zero Ozone Depletion Potential (ODP) blowing agent and faced on both sides with low emissivity composite foil.
 - 1. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 2. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
 - 3. Comply with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 - 4. Board Width, Nominal: 47-1/4 inch.
 - 5. Board Length, Nominal: 96 inch.
 - 6. Board Thickness, Nominal: As indicated on drawings.
 - 7. Board Edges: Square.
 - 8. Water Absorption: 1.2 percent by volume, maximum.
 - 9. Compressive Strength: 15 psi (104 kPa), minimum.
 - 10. Thermal Resistance: R-value of 8.05, minimum, per inch at 75 degrees F, minimum, when tested according to ASTM C518.
 - 11. Products:
 - a. Kingspan Insulation LLC; Kooltherm K15 Rainscreen Board: www.kingspan.com/#sle.
- C. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, comply with ASTM C1289.
 - 1. Classifications:
 - a. Type I: Faced with aluminum foil on both major surfaces of the core foam.
 - 1) Class 2 - Glass fiber reinforced or non-reinforced core foam.
 - 2) Compressive Strength: 16 psi, minimum.
 - 3) Thermal Resistance, R-value: At 1-1/2 inch thick; 9.0, minimum, at 75 degrees F.
 - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
 - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.

4. Water Vapor Permeance: 1.2 perm, maximum, at 1 inch thickness, and when tested in accordance with ASTM E96/E96M, desiccant method.
5. Comply with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
6. Board Size: 48 inch by 96 inch.
7. Board Edges: Square.
8. Products:
 - a. Atlas Roofing Corporation: www.atlasroofing.com/#sle.
 - b. Carlisle Coatings & Waterproofing, Inc: www.carlisleccw.com/#sle.
 - c. Dow Chemical Company: www.dowbuildingsolutions.com/#sle.
 - d. Hunter Panels: www.hunterpanels.com/#sle.
 - e. Johns Manville: www.jm.com/#sle.
 - f. Rmax Inc: www.rmax.com/#sle.

2.03 SPRAY FOAM INSULATION

- A. Gap and Crack Filler: Manufacturer's standard urethane or isocyanurate, single component mix for producing low or no expansion, rigid, closed-cell foam sealant by frothing in place; 1.5-lb. nominal density.
 1. Manufacturers: Provide one of the following:
 - a. Dow Building Solutions.
 - b. Touch 'n Foam.
 - c. Todol Products.

2.04 ACCESSORIES

- A. Tape joints of rigid insulation in accordance with roofing and insulation manufacturers' instructions.
- B. Insulation Fasteners: Impaling clip of galvanized steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.
- C. Adhesive: Type recommended by insulation manufacturer for application.
- D. Structural Thermal Break/Thermal Insulation: Load-bearing, fiberglass-reinforced laminante composite material.
 1. Compressive Strength: ASTM D695; 38,900 psi.
 2. Thickness: As indicated on drawings.
 3. Product:
 - a. Fabreeka International, Inc.; Fabreeka-TIM.
 - b. Approved equal.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER

- A. Install boards horizontally on foundation perimeter.
 1. Place boards to maximize adhesive contact.
 2. Install in running bond pattern.
 3. Butt edges and ends tightly to adjacent boards and to protrusions.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Install rigid insulation directly to steel studs or exterior grade sheathing at 16 inches on center with manufacturer recommended mechanical fasteners, and tape joints with manufacturer's minimum 4 inches wide sealant tape; comply with ASTM E2357.
- B. Install boards vertically on walls.
 - 1. Install in running bond pattern.
 - 2. Butt edges and ends tightly to adjacent boards and protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- D. Fill gaps greater than 1/8-inch with spray foam or sealant as indicated in insulation manufacturer's ICC/ES evaluation report.

3.04 BOARD INSTALLATION AT CAVITY WALLS

- A. Apply adhesive to back of boards:
- B. Install boards to fit snugly between wall ties.
- C. Install boards horizontally on walls.
 - 1. Place boards to maximize adhesive contact.
 - 2. Install in running bond pattern.
 - 3. Butt edges and ends tightly to adjacent boards and protrusions.
 - 4. Fill gaps greater than 1/8-inch with spray foam or sealant as indicated in insulation manufacturer's ICC/ES evaluation report.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.05 BOARD INSTALLATION UNDER CONCRETE SLABS

- A. Place insulation under slabs on grade after base for slab has been compacted.
- B. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.
- C. Prevent insulation from being displaced or damaged while placing vapor retarder and placing slab.

3.06 FOAM INSULATION

- A. Spray foam insulation into miscellaneous voids and cavity spaces around exterior door frames, window system frames, storefront frames, window sills, louver openings, and as indicated.
 - 1. Install gap and crack filler in joints up to 1/2-inch wide.
 - 2. Install spray foam in joints greater than 1/2-inch wide.

3.07 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

**SECTION 074213
METAL WALL PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for exterior wall panels and subgirt framing assembly, with related flashings and accessory components.

1.02 RELATED REQUIREMENTS

- A. Section 079200 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

1.03 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- B. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
- C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

1.04 SUBMITTALS

- A. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
 - 1. Physical characteristics of components shown on shop drawings.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation instructions and recommendations.
- B. Shop Drawings: Indicate dimensions, layout, joints, construction details, and methods of anchorage.
- C. Samples: Submit two samples of wall panel, 12 inches by 12 inches in size illustrating finish color, sheen, and texture.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:

- a. Certify recycled material content for recycled content products.
- b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in installing products specified in this section with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

1.08 FIELD CONDITIONS

- A. Do not install wall panels when air temperature or relative humidity are outside manufacturer's limits.

1.09 WARRANTY

- A. Correct defective work within a twenty year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.

PART 2 PRODUCTS

2.01 METAL WALL PANEL SYSTEM

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
 - 1. Provide exterior wall panels and subgirt framing assembly.
 - 2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
 - a. Provide thermally broken attachment system. Z-Furring that bridges continuous insulation is not allowed.
 - 3. Design Pressure: In accordance with ASCE 7 and loads indicated on Structural Drawings.
 - 4. Maximum Allowable Deflection of Panel: $L/180$ for length(L) of span.
 - 5. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 - 6. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 - 7. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
 - 8. Corners: Factory-fabricated in one continuous piece with minimum 2-inch returns.
- B. Exterior Wall Panels:
 - 1. Profile: Vertical and horizontal, as indicated; Corrugated.
 - 2. Side Seams: Double-interlocked, tight-fitting, sealed according to manufacturer's instructions.
 - 3. Material: Precoated aluminum sheet, 20 gage, 0.032 inch minimum thickness.
 - 4. Color: As selected by Architect from manufacturer's full line.
- C. Exterior Wall Panels (Perforated):
 - 1. Profile: Vertical and horizontal, as indicated; Corrugated.
 - 2. Side Seams: Double-interlocked, tight-fitting, sealed according to manufacturer's instructions.
 - 3. Material: Precoated aluminum sheet, 20 gage, 0.032 inch minimum thickness.
 - 4. Perforations: As selected by Architect.

5. Color: As selected by Architect from manufacturer's full line.
- D. Exterior Flat-Lock-Wall Panels:
 1. Individual wall tiles rectilinear in shape with interlocking design, self-aligning tab, and concealed attachment strip.
 2. Aluminum alloy; ASTM B209, 3003-H14/3105-H14 for painted finish.
 3. Thickness: 0.040 inch.
 4. Exposure: 14-1/2 inches by 8-3/8 inches, nominal
 5. Finish: Fluoropolymer Coil Coating System.
 6. Products:
 - a. Firestone Metal Products; UNACLAD.
 - b. Petersen Aluminum Corporation; PAC-CLAD.
- E. Subgirt Framing Assembly:
 1. Profile as indicated; to attach panel system to building.
 2. ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated.
- F. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
- G. Trim, Closure Pieces, Caps, and Flashings: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- H. Anchors: Stainless steel.

2.02 MATERIALS

- A. Precoated Aluminum Sheet: ASTM B209/B209M, 3105 alloy, O temper, with smooth surface texture; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.
- B. Select materials with surface flatness, smoothness, and lack of surface blemishes where exposed to view in finished system.

2.03 FINISHES

- A. Exposed Surface Finish: Panel manufacturer's standard polyvinylidene fluoride (PVDF) coating, top coat over epoxy primer.
- B. Panel Backside Finish: Panel manufacturer's standard siliconized polyester wash coat.
- C. Fluoropolymer Coil Coating System: Manufacturer's standard multi-coat metal coil coating system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of coil coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss to match sample.

2.04 ACCESSORIES

- A. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.
- B. Concealed Sealants: Non-curing butyl sealant or tape sealant, see Section 079200
- C. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
- D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, stainless steel. Fastener cap same color as exterior panel.
- E. Field Touch-up Paint: As recommended by panel manufacturer.
- F. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing members are ready to receive panels.

3.02 PREPARATION

- A. Install subgirts perpendicular to panel length, except as otherwise indicated, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals required based on delegated design.

3.03 INSTALLATION

- A. Install panels on walls in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint; allow to dry prior to wall panel installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Lap panel ends 2 inches, minimum.
- F. Provide expansion and control joints where indicated.
- G. Use concealed fasteners unless otherwise indicated by Architect.
- H. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.04 TOLERANCES

- A. Offset From True Alignment Between Adjacent Members Abutting or In Line: 1/16 inch, maximum.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/8 inch.
- C. Panel and Trim Plumbness (in Wall Plane): 1/4 inch in 20 feet.

3.05 CLEANING

- A. Remove protective material from wall panel surfaces.
- B. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

3.06 PROTECTION

- A. Protect metal wall panels until completion of project.
- B. Touch-up, repair, or replace damaged wall panels or accessories before Date of Substantial Completion.

END OF SECTION

**SECTION 075400
THERMOPLASTIC MEMBRANE ROOFING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adhered system with thermoplastic roofing membrane.
- B. Insulation, flat and tapered.
- C. Vapor retarder.
- D. Deck sheathing.
- E. Flashings.

1.02 REFERENCE STANDARDS

- A. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
- B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
- C. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing.
- D. NRCA (RM) - The NRCA Roofing Manual.
- E. UL (FRD) - Fire Resistance Directory.

1.03 SUBMITTALS

- A. Product Data: Provide data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
- B. Shop Drawings: Submit drawings that indicate joint or termination detail conditions, conditions of interface with other materials, and setting plan for tapered insulation.
- C. Specimen Warranty: For approval.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
 - 2. Submit installer's written verification that installation complies with warranty conditions for waterproof membrane.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.

- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with at least ten years of documented experience.
- C. Roofing Wood Nailers: Wood Nailers shall be secured in accordance with FM Global Property Loss Prevention Data Sheet 1-49.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original containers, dry and undamaged, with seals and labels intact, unless otherwise indicated.
- B. Store materials in weather protected environment, clear of ground and moisture.
- C. Ensure storage and staging of materials does not exceed static and dynamic load-bearing capacities of roof decking.
- D. Protect foam insulation from direct exposure to sunlight.

1.07 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather.
- B. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.
- D. Schedule applications so that no partially completed sections of roof are left exposed at end of workday.

1.08 WARRANTY

- A. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing that leaks or is damaged due to wind or other natural causes.
 - 1. Warranty Term: 20 years.
 - 2. For repair and replacement include costs of both material and labor in warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Thermoplastic Polyolefin (TPO) Membrane Roofing Materials:
 - 1. Carlisle Roofing Systems, Inc: www.carlisle-syntec.com/#sle.
 - 2. Firestone Building Products, LLC: www.firestonebpco.com/#sle.
 - 3. Johns Manville: www.jm.com/#sle.
 - 4. Versico, a division of Carlisle Construction Materials Inc: www.versico.com/#sle.
- B. Insulation:
 - 1. Insulation manufactured by membrane manufacturer.

2.02 ROOFING

- A. Thermoplastic Membrane Roofing: One ply membrane, fully adhered, over vapor retarder and insulation.
- B. Roofing Assembly Requirements:
 - 1. Roof Covering External Fire Resistance Classification: UL (FRD) Class A.
- C. Acceptable Insulation Types - Constant Thickness Application:
 - 1. Minimum 2 layers of polyisocyanurate board.
- D. Acceptable Insulation Types - Tapered Application:
 - 1. Tapered polyisocyanurate board.

2.03 MEMBRANE ROOFING AND ASSOCIATED MATERIALS

- A. Membrane Roofing Materials:
 - 1. TPO: Thermoplastic polyolefin (TPO) complying with ASTM D6878/D6878M, sheet contains reinforcing fabrics or scrim.
 - a. Thickness: 60 mil, 0.060 inch, minimum.
 - 2. Sheet Width: Factory fabricated into widest possible sheets.
 - 3. Color: White.
- B. Seaming Materials: As recommended by membrane manufacturer.
- C. Vapor Retarder: Material approved by roof manufacturer complying with requirements of fire rating classification; compatible with roofing and insulation materials.
 - 1. Fire-retardant adhesive.
- D. Flexible Flashing Material: Same material as membrane.

2.04 DECK SHEATHING

- A. Deck Sheathing: Glass-mat faced gypsum panels complying with ASTM C1177/C1177M.
 - 1. Thickness: 1/2 inch, fire-resistant.
 - 2. Products:
 - a. Georgia-Pacific; DensDeck Prime with EONIC Technology: www.densdeck.com/#sle.
 - b. USG Corporation; Securock Ultralight Coated Glass-Mat Roof Board: www.usg.com/#sle.

2.05 INSULATION

- A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
 - 1. Classifications:
 - a. Type II: Faced with either cellulosic facers or glass fiber mat facers on both major surfaces of the core foam.
 - 1) Class 2 - Faced with coated polymer-bonded glass fiber mat facers on both major surfaces of core foam.
 - 2) Compressive Strength: Classes 1-2-3, Grade 2 - 20 psi (138 kPa), minimum.
 - 3) Thermal Resistance, R-value: At 1-1/2 inches thick; Class 1, Grades 1-2-3, 8.4 (1.48), minimum, at 75 degrees F.
 - 2. Board Size: 48 by 96 inches.
 - 3. Board Thickness: 2.0 inch.
 - 4. Tapered Board: Slope as indicated; minimum thickness 1.0 inch; fabricate of fewest layers possible.
 - 5. Board Edges: Square.

2.06 ACCESSORIES

- A. Stack Boots: Prefabricated flexible boot and collar for pipe stacks through membrane; same material as membrane.
- B. Insulation Fasteners: Appropriate for purpose intended and approved by roofing manufacturer.

1. Length as required for thickness of insulation material and penetration of deck substrate, with metal washers.
- C. Membrane Adhesive: As recommended by membrane manufacturer.
- D. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips are in place.

3.02 PREPARATION - METAL DECK

- A. Install deck sheathing on metal deck:
 1. Lay with long side at right angle to flutes; stagger end joints; provide support at ends.
 2. Cut sheathing cleanly and accurately at roof breaks and protrusions to provide smooth surface.
 3. Mechanically fasten sheathing to roof deck, in accordance with roofing manufacturer's instructions and uplift design requirements.
 - a. Over entire roof area, fasten sheathing using six fasteners with washers per sheathing board.

3.03 INSTALLATION, GENERAL

- A. Perform work in accordance with manufacturer's instructions and NRCA (RM) applicable requirements and uplift design requirements.
- B. Do not apply roofing membrane during cold or wet weather conditions.
- C. Do not apply roofing membrane when ambient temperature is outside the temperature range recommended by manufacturer.
- D. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day.

3.04 INSTALLATION - VAPOR RETARDER AND INSULATION, UNDER MEMBRANE

- A. Install vapor retarder to deck surface with adhesive in accordance with manufacturer's instructions.
 1. Extend vapor retarder under cant strips and blocking to deck edge.
 2. Install flexible flashing from vapor retarder to air seal material of wall construction, lap and seal to provide continuity of the air barrier plane.
- B. Ensure vapor retarder is clean and dry, continuous, and ready for application of insulation.
- C. Attachment of Insulation: Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions.
- D. Lay subsequent layers of insulation with joints staggered minimum 6 inches from joints of preceding layer.
- E. Place tapered insulation to the required slope pattern in accordance with manufacturer's instructions.

- F. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- G. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- H. At roof drains, use factory-tapered boards to slope down to roof drains over a distance of 18 inches.
- I. Do not install more insulation than can be covered with membrane in same day.

3.05 INSTALLATION - MEMBRANE

- A. Roll out membrane, free from wrinkles or tears. Place sheet into place without stretching.
- B. Shingle joints on sloped substrate in direction of drainage.
- C. Fully Adhered Application: Apply adhesive to substrate at rate recommended by manufacturer. Fully embed membrane in adhesive except in areas directly over or within 3 inches of expansion joints. Fully adhere one roll before proceeding to adjacent rolls.
- D. Overlap edges and ends and seal seams by heat welding, minimum 3 inches. Seal permanently waterproof.
- E. At intersections with vertical surfaces:
 - 1. Extend membrane up a minimum of 8 inches onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
- F. Around roof penetrations, seal flanges and flashings with flexible flashing.
- G. Coordinate installation of roof drains and sumps and related flashings.

3.06 CLEANING

- A. Remove bituminous markings from finished surfaces.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.
- C. Repair or replace defaced or damaged finishes caused by work of this section.

3.07 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION

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**SECTION 076200
SHEET METAL FLASHING AND TRIM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fabricated sheet metal items, including flashings and counterflashings.
- B. Sealants for joints within sheet metal fabrications.

1.02 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- C. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual.

1.03 SUBMITTALS

- A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- B. Samples: Submit two samples 3 by 4 inch in size illustrating metal finish color.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with SMACNA (ASMM) requirements and standard details, except as otherwise indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

- B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 SHEET MATERIALS

- A. Pre-Finished Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; plain finish shop pre-coated with fluoropolymer coating.
 - 1. Fluoropolymer Coating: High performance organic powder coating, AAMA 2604; multiple coat, thermally cured fluoropolymer finish system.
 - 2. Color: As selected by Architect from manufacturer's full colors.
- B. Stainless Steel: ASTM A666, Type 304 alloy, soft temper, 26 gauge, 0.019 inch thick; smooth No. 4 - Brushed finish.

2.02 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet, one gauge thicker, minimum 1.5 inches wide, interlocking with sheet.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with lapped seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Fabricate corners from one piece with minimum 18-inch long legs; seam for rigidity, seal with sealant.
- G. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

2.03 ACCESSORIES

- A. Primer Type: Zinc chromate.
- B. Concealed Sealants: Non-curing butyl sealant.
- C. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.
- D. Asphalt Roof Cement: ASTM D4586/D4586M, Type I, asbestos-free.

PART 3 EXECUTION

3.01 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil, 0.015 inch.

3.02 INSTALLATION

- A. Comply with drawing details.
- B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- C. Apply plastic cement compound between metal flashings and felt flashings.
- D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- E. Seal metal joints watertight.

END OF SECTION

**SECTION 077100
ROOF SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured roof specialties, including fascias.

1.02 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
- B. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems.
- C. NRCA (RM) - The NRCA Roofing Manual.

1.03 SUBMITTALS

- A. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.
- B. Shop Drawings: Indicate configuration and dimension of components, adjacent construction, required clearances and tolerances, and other affected work.
- C. Samples: Submit two samples, 3 inch wide by 4 inch high, illustrating finish and color.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Roofing Wood Nailers: Wood Nailers shall be secured in accordance with FM Global Property Loss Prevention Data Sheet 1-49.

- B. Products shall be manufactured in specified manufacturer's facilities. Products fabricated by installer or other fabricator will not be acceptable unless fabricator can demonstrate to Architect's satisfaction that products have been tested and passed ANSI/SPRI/FM 4435/ES-1 Wind Design Standard and meet required design pressures for perimeter and corner zones.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Roof Edge Flashings and Copings:
 - 1. ATAS International, Inc: www.atas.com/#sle.
 - 2. Hickman Edge Systems: www.hickmanedgesystems.com/#sle.
 - 3. Metal-Era Inc: www.metalera.com/#sle.

2.02 COMPONENTS

- A. Roof Edge Flashings: Factory fabricated to sizes required; corners mitered; concealed fasteners.
 - 1. Configuration: Fascia, cant, and edge securement for roof membrane.
 - 2. Pull-Off Resistance: Tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test methods RE-1 and RE-2 to positive and negative design wind pressure as defined by applicable local building code, and as indicated on Structural Drawings.
 - 3. Exposed Face Height: As indicated on drawings.
 - 4. Material: Formed aluminum sheet, 0.050 inch thick, minimum.
 - 5. Finish: 70 percent polyvinylidene fluoride.
 - 6. Color: As selected by Architect from manufacturer's full range.

2.03 FINISHES

- A. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as indicated.

2.04 ACCESSORIES

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Seal joints within components when required by component manufacturer.
- C. Anchor components securely.
- D. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- E. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.

END OF SECTION

**SECTION 078400
FIRESTOPPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping systems.
- B. Firestopping of joints and penetrations in fire-resistance-rated and smoke-resistant assemblies.

1.02 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems.
- C. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- D. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus.
- E. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies.
- F. ITS (DIR) - Directory of Listed Products.
- G. FM (AG) - FM Approval Guide.
- H. SCAQMD 1168 - Adhesive and Sealant Applications.
- I. UL 1479 - Standard for Fire Tests of Penetration Firestops.
- J. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.
- K. UL (DIR) - Online Certifications Directory.
- L. UL (FRD) - Fire Resistance Directory.

1.03 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes or cut openings to accommodate through-penetration firestop systems.
- C. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- D. Coordinate gypsum barrier construction prior to installing penetrating items and firestop to ensuring barrier integrity and continuity.

1.04 SUBMITTALS

- A. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- B. System Drawings: Submit documentation from a qualified third-party testing agency that is applicable to each firestopping system configuration for construction, joint opening width and/or penetrating items.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals

- a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
 - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Trained by manufacturer.

1.07 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products: www.3m.com/firestop/#sle.
 - 2. A/D Fire Protection Systems Inc: www.adfire.com/#sle.
 - 3. Hilti, Inc: www.us.hilti.com/#sle.
 - 4. RectorSeal, a CSW Industrials Company: www.rectorseal.com/firestop-solutions/#sle.
 - 5. Specified Technologies Inc: www.stfirestop.com/#sle.
 - 6. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.

2.02 MATERIALS

- A. Firestopping Materials: Any materials meeting requirements.
- B. Obtain firestopping systems for each type of penetration or joint opening and construction condition indicated from a single manufacturer.

- C. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- D. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
- B. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
- C. Floor-to-Floor (FF), Floor-to-Wall (FW), Head-of-Wall (HW), and Wall-to-Wall (WW) Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
 - 1. Movement: Provide systems that have been tested to show movement capability as indicated.
 - 2. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.
- D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
 - 1. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING SYSTEMS

- A. Firestopping: Any material meeting requirements.
 - 1. Fire Ratings: Use system that is listed by FM (AG), ITS (DIR), or UL (FRD) and tested in accordance with ASTM E814, ASTM E119, or UL 1479 with F Rating equal to fire rating of penetrated assembly and minimum T Rating Equal to F Rating and in compliance with other specified requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authorities having jurisdiction.
- C. Install labeling required by code.

3.04 FIELD QUALITY CONTROL

- A. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION

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**SECTION 079100
PREFORMED JOINT SEALS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Precompressed foam seals.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's technical data sheets for each product, including chemical composition, movement capability, color availability, limitations on application, and installation instructions.

1.03 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Precompressed Foam Seals:
 - 1. Balco, Inc: www.balcousa.com/#sle.
 - 2. EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
 - 3. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com/#sle.
 - 4. Watson Bowman Acme Corporation: www.watsonbowmanacme.com/#sle.

2.02 PRECOMPRESSED FOAM SEALS

- A. Precompressed Foam Seal: Comprised of closed-cell neoprene foam impregnated with water-repellent, and with self-adhesive faces protected prior to installation by release paper.
 - 1. Color: Black.
 - 2. Size as required to provide weathertight seal when installed.
 - 3. Calculate size according to manufacturer's recommendations.
 - 4. Measure size of existing joints before selecting seal width.
 - 5. Basis of Design Product: Tremco Commercial Sealants & Waterproofing; Willseal 600.

2.03 ACCESSORIES

- A. Adhesive: As recommended by seal manufacturer.
- B. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and strip seal.
- C. Substrate Cleaner: Non-corrosive, non-staining type recommended by seal manufacturer; compatible with joint forming materials.
- D. Primer: Type recommended by seal manufacturer to suit application; non-staining.
- E. Backing Tape: Self-adhesive polyethylene tape with surface that seal will not adhere to.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive this work.
- B. Measure joint dimensions and verify that seal products are of the correct size to properly seal the joints.

3.02 PREPARATION

- A. Properly prepare construction components adjacent to the work of this section to prevent damage and disfigurement due to this work.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Precompressed Foam Seals:
 - 1. Install only when ambient temperature is within recommended application temperature range of adhesive. Consult manufacturer when installing outside this temperature range.
 - 2. Prepare joints and install seals in accordance with manufacturer's written recommendations.
 - 3. Remove loose materials and foreign matter that could impair adhesion of sealant.
 - 4. Do not stretch precompressed seal; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

END OF SECTION

**SECTION 079200
JOINT SEALANTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

1.03 REFERENCE STANDARDS

- A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015 (Reapproved 2022).
- B. ASTM C794 - Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants 2018 (Reapproved 2022).
- C. ASTM C834 - Standard Specification for Latex Sealants 2017.
- D. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.
- E. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications 2022.
- F. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- G. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2016.
- H. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- I. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2022.
- J. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints 2019 (Reapproved 2020).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's technical datasheets for each product to be used; include the following:
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
 - 5. Substrates for which use of primer is required.
- C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- D. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- E. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation; see Section 016116.
- F. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
- G. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

- H. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.
- I. Executed warranty.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Allow sufficient time for testing to avoid delaying the work.
 - 4. Deliver sufficient samples to manufacturer for testing.
 - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
- E. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
 - 1. Identification of testing agency.
 - 2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
 - a. Test date.
 - b. Copy of test method documents.
 - c. Age of sealant upon date of testing.

- d. Test results, modeled after the sample form in the test method document.
 - e. Indicate use of photographic record of test.
- F. Field Adhesion Test Procedures:
 - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
 - 2. Have a copy of the test method document available during tests.
 - 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 - 4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
 - 5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
 - 6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- G. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
 - 1. Sample: At least 18 inches long.
 - 2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the 1-inch mark is that distance from the substrate, the test has failed.
 - 3. If either adhesive or cohesive failure occurs before minimum elongation, take necessary measures to correct conditions and retest; record each modification to products or installation procedures.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Manufacturer Warranty: Provide 2-year manufacturer warranty for installed sealants and accessories that fail to achieve a watertight seal, exhibit loss of adhesion or cohesion, or do not cure. Complete forms in Owner's name and register with manufacturer.
- C. Extended Correction Period: Correct defective work within 2-year period commencing on Date of Substantial Completion.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to:
 - a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
 - f. Concrete cracks.
 - g. Ends in barrier walls.
 - 2. Do not seal the following types of joints:
 - a. Slab on grade control joints
 - b. Intentional weep holes in masonry.
 - c. Joints indicated to be treated with manufactured expansion joint cover, or some other type of sealing device.
 - d. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - e. Joints where installation of sealant is specified in another section.
 - f. Joints between suspended panel ceilings/grid and walls.

- B. Type ____ - Exterior Joints: Use nonsag nonstaining silicone sealant, unless otherwise indicated.

2.02 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products with acceptable levels of volatile organic compound (VOC) content; see Section 016116.

2.03 NONSAG JOINT SEALANTS

- A. Nonstaining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.
 - 2. Nonstaining to Porous Stone: Nonstaining to light-colored natural stone when tested in accordance with ASTM C1248.
 - 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
- B. Type ____ - Hybrid Elastomeric Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
 - 1. Movement Capability: Plus and minus 50 percent, minimum.

2.04 SELF-LEVELING JOINT SEALANTS

- A. Type ____ - Self-Leveling Polyurethane Sealant for Continuous Water Immersion: Polyurethane; ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure and continuous water immersion.
 - 1. Movement Capability: Plus and minus 25 percent, minimum.
- B. Type ____ - Self-Leveling Silyl-Terminated Polyether/Polyurethane (STPE/STPU) Sealant: ASTM C920, Grade P, Uses M and A; single component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion.
 - 1. Movement Capability: Plus and minus 35 percent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.
- D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
 - 1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
 - 2. Notify Architect of date and time that tests will be performed, at least seven days in advance.
 - 3. Record each test on Preinstallation Adhesion Test Log as indicated.
 - 4. If any sample fails, review products and installation procedures, consult manufacturer, or take other measures that are necessary to ensure adhesion; retest in a different location; if unable to obtain satisfactory adhesion, report to Architect.
 - 5. After completion of tests, remove remaining sample material and prepare joints for new sealant installation.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.
- E. Concrete Floor Joints That Will Be Exposed in Completed Work: Test joint filler in an inconspicuous area to verify that it does not stain or discolor slab.

3.03 INSTALLATION

- A. Install this work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Provide joint sealant installations complying with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements for additional requirements.
- B. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.
- C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

**SECTION 079513
EXPANSION JOINT COVER ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Expansion joint cover assemblies for wall surfaces.

1.02 REFERENCE STANDARDS

- A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Installation Templates: For frames and anchors to be embedded in concrete or masonry, furnish templates to relevant installers; include installation instructions and tolerances.

1.04 SUBMITTALS

- A. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.
- B. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.
- C. Samples: Submit two samples 6 inch long, illustrating profile, dimension, color, and finish selected.
- D. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.

- b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Expansion Joint Cover Assemblies:
 - 1. Architectural Art Mfg, Inc: www.archart.com/#sle.
 - 2. Balco, Inc: www.balcousa.com/#sle.
 - 3. Construction Specialties, Inc: www.c-sgroup.com/#sle.
 - 4. EMSEAL Joint Systems, Ltd: www.emseal.com/#sle.
 - 5. Watson Bowman Acme Corporation: www.watsonbowmanacme.com/#sle.

2.02 EXPANSION JOINT COVER ASSEMBLIES

- A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
 - 1. Joint Dimensions and Configurations: As indicated on drawings.
 - 2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
 - 3. Joint Movement Capability: If not indicated, provide minimum plus/minus 25 percent joint movement capability.
 - 4. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
 - 5. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.
- B. Resilient Seal Type Covers: Having flat exposed surface without crevices that could collect dirt; designed to withstand expected movement without extrusion of seal from joint assembly; for floors, provide style that is flush with top of floor covering; for exterior joints, weathertight.

2.03 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
 - 1. Exposed Finish Outdoors: Natural anodized.
- B. Resilient Seals:
 - 1. Color: Gray.
- C. Anchors and Fasteners: As recommended by cover manufacturer.
- D. Ferrous Metal Anchors: Galvanized where embedded in concrete or in contact with cementitious materials.
- E. Threaded Fasteners: Aluminum.
- F. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.
- B. Verify that frames and anchors installed by others are in correct locations and suitable for installation of remainder of assembly.

3.02 INSTALLATION

- A. Install components and accessories in accordance with manufacturer's instructions.
- B. Align work plumb and level, flush with adjacent surfaces.
- C. Rigidly anchor to substrate to prevent misalignment.

3.03 PROTECTION

CDA - Village on Park Parking Structure and Site Improvements

- A. Do not permit traffic over unprotected floor joint surfaces.
- B. Provide strippable coating to protect finish surface.

END OF SECTION

**SECTION 081113
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Fire-rated hollow metal doors and frames.
- C. Thermally insulated hollow metal doors with frames.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100).
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.
- I. ASTM C476 - Standard Specification for Grout for Masonry.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- K. BHMA A156.115 - Hardware Preparation in Steel Doors and Steel Frames.
- L. ICC A117.1 - Accessible and Usable Buildings and Facilities.
- M. ITS (DIR) - Directory of Listed Products.
- N. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames.
- O. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames.
- P. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames.
- Q. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames.
- R. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
- S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- T. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.
- U. UL (DIR) - Online Certifications Directory.
- V. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.

1.03 SUBMITTALS

- A. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.
- B. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 2. Curries, an Assa Abloy Group company: www.assaabloydss.com/#sle.
 - 3. Mesker, dormakaba Group: www.meskeropeningsgroup.com/#sle.
 - 4. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
 - 5. Steelcraft, an Allegion brand: www.allegion.com/#sle.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:
 - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 - 4. Door Edge Profile: Manufacturers standard for application indicated.
 - 5. Typical Door Face Sheets: Flush.
 - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturer's standard.

7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvannealed) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvannealed) for corrosive locations.
- B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy-duty.
 - b. Physical Performance Level A 1 000 000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 2 - Seamless.
 - d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
 - e. Zinc Coating: A60/ZF180 galvannealed coating; ASTM A653/A653M.
 2. Door Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
 - a. Foam Plastic Insulation: Manufacturer's standard board insulation with maximum flame spread index (FSI) of 75, and maximum smoke developed index (SDI) of 450 in accordance with ASTM E84, and completely enclosed within interior of door.
 3. Door Thickness: 1-3/4 inches, nominal.
- C. Interior Doors, Non-Fire-Rated:
 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 2 - Seamless.
 - d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 3. Door Thickness: 1-3/4 inches, nominal.
- D. Fire-Rated Doors:
 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 2 - Heavy-duty.
 - b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.
 - c. Model 2 - Seamless.
 - d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 3. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - a. Attach fire rating label to each fire rated unit.
 4. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
 5. Door Thickness: 1-3/4 inches, nominal.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
 - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A60/ZF180 coating.
 - 2. Frame Metal Thickness: 14 gauge, 0.067 inch, minimum.
 - 3. Weatherstripping: Separate, see Section 087100.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
 - 1. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- E. Door Frames, Fire-Rated: Full profile/continuously welded type.
 - 1. Fire Rating: Same as door, labeled.
 - 2. Frame Metal Thickness: 16 gauge, 0.053 inch, minimum.
- F. Transom Bars: Fixed, of profile same as jamb and head.
- G. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- H. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
- I. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

- A. Glazing: As specified in Section 088000 and 088813, factory installed.
- B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.
- D. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
- E. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- F. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 087100.
- F. Comply with glazing installation requirements of Section 088000.
- G. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION

**SECTION 083100
ACCESS DOORS AND PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall-mounted access units.

1.02 SUBMITTALS

- A. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

1.03 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Wall-Mounted Units:
 - 1. Location: As indicated on drawings.
 - 2. Panel Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
 - 3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
 - 4. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
 - 5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
 - 6. Masonry Mounting Criteria: Provide surface-mounted frame with door surface flush with frame surface.

2.02 WALL-MOUNTED ACCESS UNITS

- A. Manufacturers:
 - 1. Activar Construction Products Group, Inc. - JL Industries: www.activarcpg.com/#sle.
 - 2. ACUDOR Products Inc: www.acudor.com/#sle.

3. Babcock-Davis: www.babcockdavis.com/#sle.
 4. Cendrex, Inc: www.cendrex.com/#sle.
 5. Nystrom, Inc: www.nystrom.com/#sle.
- B. Wall-Mounted Units: Factory-fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
1. Door Style: Single thickness with rolled or turned in edges.
 2. Frames: 16-gauge, 0.0598-inch minimum thickness.
 3. Single Steel Sheet Door Panels: 16-gauge, 0.0625-inch minimum thickness.
 4. Steel Finish: Primed.
 5. Hardware:
 - a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
 - b. Latch/Lock: Screw driver slot for quarter turn cam latch.
 - c. Gasketing: Extruded neoprene, around perimeter of door panel.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to proceeding with this work.
- B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

**SECTION 083323
OVERHEAD COILING DOORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Exterior coiling doors.

1.02 REFERENCE STANDARDS

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.03 SUBMITTALS

- A. Product Data: Provide general construction and component connections and details.
- B. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Overhead Coiling Doors:

1. Alpine Overhead Doors, Inc: www.alpinedoors.com/#sle.
2. C.H.I. Overhead Doors: www.chiohd.com/#sle.
3. Clopay Building Products: www.clopaydoor.com/#sle.
4. Cornell Iron Works, Inc: www.cornelliron.com/#sle.
5. Raynor Garage Doors: www.raynor.com/#sle.
6. The Cookson Company: www.cooksondoor.com/#sle.
7. Wayne-Dalton, a Division of Overhead Door Corporation: www.wayne-dalton.com/#sle.

2.02 COILING DOORS

- A. Exterior Coiling Doors: Steel slat curtain.
 1. Capable of withstanding positive and negative wind loads of 20 psf without undue deflection or damage to components.
 2. Sandwich Slats: Manufacturer's standard, with core of foamed-in-place polyurethane insulation; minimum R-value of 4.88.
 3. Nominal Slat Size: 2 inches wide by required length.
 4. Finish: Factory painted, color as selected.
 5. Guide, Angles: Galvanized steel.
 6. Hood Enclosure: Manufacturer's standard; primed steel.
 7. Manual push up operation.
 8. Mounting: As indicated on drawings.
 9. Locking Devices: Lock and latch handle on outside.

2.03 MATERIALS AND COMPONENTS

- A. Metal Curtain Construction: Interlocking slats.
 1. Curtain Bottom for Slat Curtains: Fitted with angles to provide reinforcement and positive contact in closed position.
 2. Weatherstripping for Exterior Doors: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.
 3. Steel Slats: Minimum thickness, 20 gauge, 0.0359 inch; ASTM A653/A653M galvanized steel sheet.
 - a. Galvanizing: Minimum G90 coating.
- B. Guide Construction: Continuous, of profile to retain door in place with snap-on trim, mounting brackets of same metal.
- C. Guides - Angle: ASTM A36/A36M metal angles, size as indicated.
 1. Hot-dip galvanized in compliance with ASTM A123/A123M.
- D. Hood Enclosure and Trim: Internally reinforced to maintain rigidity and shape.
- E. Lock Hardware:
 1. Latchset Lock Cylinders: Standard mortise cylinder.
 - a. Keying: Differently.
 2. Latch Handle: Manufacturer's standard.
- F. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that adjacent construction is suitable for door installation.
- B. Verify that door opening is plumb, header is level, and dimensions are correct.
- C. Notify Architect of any unacceptable conditions or varying dimensions.
- D. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Install enclosure and perimeter trim.

3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 feet straight edge.

3.04 ADJUSTING

- A. Adjust operating assemblies for smooth and noiseless operation.

END OF SECTION

**SECTION 084229
AUTOMATIC ENTRANCES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sliding type packaged power-operated door assemblies.
- B. Controllers, actuators and safety devices.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design.
- B. BHMA A156.10 - Power Operated Pedestrian Doors.
- C. NFPA 101 - Life Safety Code.

1.03 SUBMITTALS

- A. Shop Drawings:
 - 1. Indicate layout and dimensions; head, jamb, and sill conditions; elevations; components, anchorage, recesses, materials, and finishes, electrical characteristics and connection requirements.
- B. Product Data: Include system components, sizes, features, and finishes.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience, and a member of AAADM.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sliding Automatic Entrance Door Assemblies:
 - 1. ASSA ABLOY Entrance Solutions: www.besam-usa.com/#sle.
 - 2. DORMA USA, Inc: www.dorma.com/#sle.
 - 3. Horton Automatics: www.hortondoors.com/#sle.
 - 4. record-usa: www.recorddoors.com/#sle.
 - 5. Stanley Access Technologies: www.stanleyaccess.com/#sle.

2.02 POWER OPERATED DOORS

- A. Power Operated Doors: Provide products that comply with NFPA 101 and requirements of authorities having jurisdiction; provide equipment selected for actual door weight and for light pedestrian traffic, unless otherwise indicated.
 - 1. Sliding and Folding Door Operators: In the event of power failure, provide for manual open, close, and break-away operation of door leaves.
 - 2. Packaged Door Assemblies: Provide components by single manufacturer, factory-assembled, including doors, frames, operators, actuators, and safeties.
 - a. Finish exposed equipment components to match door and frame finish.
- B. Sliding and Folding Doors with Full Power Operators: Comply with BHMA A156.10; safeties required; provide break-away operation unless otherwise indicated; in the event of break-away operation, interrupt power operation.
- C. Operators:
 - 1. Electric Operators: 1/2 hp minimum, self-contained, with release clutch.

2.03 AUTOMATIC ENTRANCE DOOR ASSEMBLIES

- A. Comply with ADA Standards for egress requirements.
- B. Framing and Transom Members: Provide manufacturer's standard extruded aluminum framing, reinforced as required to support imposed loads.
 - 1. Nominal Sizes:
 - a. Single Slide and Bi-Parting Sliding Doors: 1-3/4 inch wide by 4-1/2 inch deep.
 - 2. Concealed Fastening: Provide concealed fastening pocket in framing, with continuous flush insert cover extending full length of each framing member.
 - 3. Transoms: Provide flush glazed transom with framing that is integral with automatic entrance framing system.
- C. Door and Sidelight Construction: Heavy duty interlocked extruded aluminum tubular stile and rail sections, through-rod bolted construction with steel corner support at hinge stile of carrier-suspended swinging panels or mechanically fastened corners with welded reinforcing brackets to reduce sag in sliding or breakout mode.
 - 1. Door Thickness: 1-3/4 inch, nominal.
 - 2. Stile Design:
 - a. Medium stile, 3-1/2 inch, nominal width.
 - 3. Top Rail Height: 4 inch, nominal.
 - 4. Bottom Rail Height: 4 inch, nominal.
 - 5. Glazing Stops: Manufacturer's standard snap-on extruded aluminum square stops with preformed resilient glazing gaskets.
 - 6. Glazing Stop Width: Manufacturers standard.
 - 7. Glazing Thickness: 1/4 inch.
- D. Sliding Automatic Door: Single leaf track-mounted, electric operation, extruded aluminum glazed door, with frame, and operator concealed overhead.
 - 1. Operation: Power open, power boost operation.
 - 2. Exterior-Side Actuator/Safety: Motion sensor.
 - 3. Interior-Side Actuator/Safety: Motion sensor.
 - 4. Door and Frame Finish: Same as adjacent framing system.

2.04 CONTROLLERS, ACTUATORS, AND SAFETIES

- A. Controller: Provide microprocessor operated controller for each door.
- B. Comply with BHMA A156.10 for actuator and safety types and zones.
- C. Motion Sensor Actuator/Safety: Passive infrared; distance of control sensitivity adjustable.
- D. Photo-Electric Actuator/Safety: Horizontal single ray device, with aluminum housing for light source and relay units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and openings and recesses are ready to receive work and dimensions are as indicated on shop drawings.
- B. Verify that electric power is available, at the correct location, and is of the correct characteristics.

3.02 INSTALLATION

- A. Install equipment in accordance with manufacturer's written instructions, except where more stringent requirements are specified.
- B. Install entrances securely anchored in place, plumb, level, and true to location, in alignment with established lines and grades, without warp, bow, or racking of members.
- C. Where frames are assembled in field, fit frame joints hairline tight without burrs or distortion; rigidly secure nonmoving joints and seal watertight.
- D. Provide for thermal expansion and contraction of door and frame units and live and dead loads that may be transmitted to operating equipment.
- E. Provide for dimensional distortion of components during operation.
- F. Coordinate installation of components with related and adjacent work; level and plumb.

3.03 ADJUSTING

- A. Adjust entrances for correct function and smooth operation, without binding or scraping and without excessive noise; lubricate operating hardware and other moving parts.

3.04 CLOSEOUT ACTIVITIES

- A. Demonstrate operation, operating components, adjustment features, and lubrication requirements.

END OF SECTION

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**SECTION 084313
ALUMINUM-FRAMED STOREFRONTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.

1.02 RELATED REQUIREMENTS

- A. Section 084229 - Automatic Entrances.
- B. Section 088000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.
- B. AAMA 501.2 - Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
- D. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- E. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
- F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- H. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- I. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
- J. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 SUBMITTALS

- A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.

- b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
 - 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
 - a. Insulating Glass Certification Council (IGCC).
 - b. Safety Glazing Certification Council (SGCC).
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.09 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.10 WARRANTY

- A. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.
- B. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Aluminum-Framed Storefronts Manufacturers:
 - 1. EFCO Corporation.
 - 2. Kawneer North America: www.kawneer.com/#sle.
 - 3. Manko Window Systems, Inc: www.mankowindows.com/#sle.
 - 4. Oldcastle BuildingEnvelope: www.oldcastlebe.com/#sle.
 - 5. Tubelite, Inc: www.tubeliteinc.com/#sle.
 - 6. Wausau Window and Wall Systems.
 - 7. YKK AP America, Inc: www.ykkap.com/commercial/#sle.

2.02 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING

- A. Center-Set Style, Thermally-Broken:

1. Basis of Design: Kawneer North America; Trifab 451UT Framing System.
 2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
- B. Center-Set Style, Not Thermally-Broken:
1. Basis of Design: Kawneer North America; Trifab Versaglaze 450 Framing System.
 2. Vertical Mullion Dimensions: 1-3/4 inches wide by 4-1/2 inches deep.

2.03 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
1. Glazing Rabbet: For 1 inch insulating glazing.
 2. Finish: Class I natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
 3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 6. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
 7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
 8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
 9. Maintain continuous air barrier and/or vapor retarder seal throughout assembly, primarily in line with inside pane of glazing, and heel bead of glazing compound.
- B. Performance Requirements
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
 - a. Design Wind Loads: Comply with requirements of ASCE 7.
 - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
 2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
 3. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 6.27 psf pressure difference.
 4. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.

2.04 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Framing members for interior applications need not be thermally broken.
 2. Glazing Stops: Flush.
 3. Backer Plates for Thermally Broken Systems: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- B. Glazing: See Section 088000.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Exposed Flashings: Aluminum sheet, 20 gauge, 0.032 inch minimum thickness; finish to match framing members.
- D. Concealed Flashings: Stainless steel, 26 gauge, 0.0187 inch minimum thickness.
- E. Subsill Flashing: Provide thermally broken subsill flashing at storefront framing.
- F. Head Receptors: Provide thermally broken head receptors.
- G. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.
- H. Glazing Accessories: See Section 088000.

2.06 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that storefront wall openings and adjoining water-resistive and/or air barrier seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Install glass using glazing method required to achieve performance criteria; see Section 088000.
- J. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

- A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.

- B. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
 - 1. Perform a minimum of two tests in each designated area as directed by Architect.
 - 2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
- C. Repair or replace storefront components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.

END OF SECTION

**SECTION 087100
DOOR HARDWARE**

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 Section "Alternates" for alternates affecting this section.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
 - a. "Metal Doors and Frames"
 - b. "Flush Wood Doors"
 - c. "Stile and Rail Wood Doors"
 - d. "Interior Aluminum Doors and Frames"
 - e. "Aluminum-Framed Entrances and Storefronts"
 - f. "Stainless Steel Doors and Frames"
 - g. "Special Function Doors"
 - h. "Entrances"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – 2016 Edition – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
 - a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
 - b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
 - a. Wiring Diagrams: For power, signal, and control wiring and including:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
 - a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
 - b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
 - c. Indicate complete designations of each item required for each opening, include:
 - 1) Door Index: door number, heading number, and Architect's hardware set number.
 - 2) Quantity, type, style, function, size, and finish of each hardware item.
 - 3) Name and manufacturer of each item.
 - 4) Fastenings and other pertinent information.
 - 5) Location of each hardware set cross-referenced to indications on Drawings.
 - 6) Explanation of all abbreviations, symbols, and codes contained in schedule.
 - 7) Mounting locations for hardware.
 - 8) Door and frame sizes and materials.
 - 9) Degree of door swing and handing.
 - 10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.
5. Key Schedule:
 - a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 - b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Final approved hardware schedule edited to reflect conditions as installed.
 - d. Final keying schedule

- e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
- f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

- 1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
 - a. Fire door assemblies, in compliance with NFPA 80.
 - b. Required egress door assemblies, in compliance with NFPA 101.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1. Project Goals

- a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
- b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.

- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.

- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Material Resources Certificates:

- a. Certify recycled material content for recycled content products.
- b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
 - a. For door hardware: DHI certified AHC or DHC.
 - b. Can provide installation and technical data to Architect and other related subcontractors.
 - c. Can inspect and verify components are in working order upon completion of installation.
 - d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.
4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
 - a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
 - b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
2. Smoke and Draft Control Door Assemblies:
 - a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105
 - b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
3. Electrified Door Hardware
 - a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.
4. Accessibility Requirements:
 - a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference

- a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - 1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2) Preliminary key system schematic diagram.
 - 3) Requirements for key control system.
 - 4) Requirements for access control.
 - 5) Address for delivery of keys.
2. Pre-installation Conference
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing-in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
 - f. Review questions or concerns related to proper installation and adjustment of door hardware.
3. Electrified Hardware Coordination Conference:
 - a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.
- C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
- D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.07 COORDINATION

- A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
- D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.08 WARRANTY

- A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.
 - 1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
 - 2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
 - a. Mechanical Warranty
 - 1) Locks
 - a) Schlage ND Series: 10 years
 - 2) Exit Devices
 - a) Von Duprin: 3 years
 - 3) Closers
 - a) LCN 4000 Series: 30 years
 - 4) Automatic Operators
 - a) LCN: 2 years

1.09 MAINTENANCE

- A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.
- B. Turn over unused materials to Owner for maintenance purposes.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.
- B. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- C. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.

C. Cable and Connectors:

1. Where scheduled in the hardware sets, provide each item of electrified hardware and wire harnesses with number and gage of wires enough to accommodate electric function of specified hardware.
2. Provide Molex connectors that plug directly into connectors from harnesses, electric locking and power transfer devices.
3. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Ives 5BB series
2. Acceptable Manufacturers and Products:
 - a. Substitutions by official Division 01 request only

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
 - a. Exterior: Heavy weight, bronze/stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
5. 2 inches or thicker doors:
 - a. Exterior: Heavy weight, bronze or stainless steel, 5 inches (127 mm) high
 - b. Interior: Heavy weight, steel, 5 inches (127 mm) high
6. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.

7. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
8. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Steel Hinges: Steel pins
 - b. Non-Ferrous Hinges: Stainless steel pins
 - c. Out-Swinging Exterior Doors: Non-removable pins
 - d. Out-Swinging Interior Lockable Doors: Non-removable pins
 - e. Interior Non-lockable Doors: Non-rising pins
9. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Schlage ND series
2. Acceptable Manufacturers and Products:
 - a. Substitutions by official Division 01 request only

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
4. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
5. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets.
8. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
 - a. Vandlgard: Provide levers with vandal resistant technology for use at heavy traffic or abusive applications.
 - b. Lever Design: RHO

2.05 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. Von Duprin 99/33A series
2. Acceptable Manufacturers and Products:
 - a. Substitutions by official Division 01 request only

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide grooved touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide exit devices with weather resistant components that can withstand harsh conditions of various climates and corrosive cleaners used in outdoor pool environments.
7. Provide flush end caps for exit devices.
8. Provide exit devices with manufacturer's approved strikes.
9. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
10. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
11. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
12. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
13. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
14. Provide electrified options as scheduled.
15. Top latch mounting: double- or single-tab mount for steel doors, face mount for aluminum doors eliminating requirement of tabs, and double tab mount for wood doors.
16. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.
17. Special Options:
 - a. CVC
 - 1) Provide cable-actuated concealed vertical latch system in two-point for non-rated or fire rated wood doors up to a 90 minute rating and less bottom latch (LBL) configuration for non-rated or fire rated wood doors up to 20 minute rating. Vertical rods not permitted.
 - a) Cable: Stainless steel with abrasive resistant coating. Conduit and core wire ends snap into latch and center slides without use of tools.
 - b) Wood Door Prep: Maximum 1 inch x 1.1875 inch x 3.875 inches top latch pocket and 1 inch x 1.1875 inch x 5 inches bottom latch pocket which does not require the use of a metal wrap or edge for non-rated or fire rated wood doors up to a 45 minute rating.
 - c) Latchbolts and Blocking Cams: Manufactured from sintered metal low carbon copper- infiltrated steel, with molybdenum disulfide low friction coating.
 - d) Top Latchbolt: Minimum 0.38 inch (10 mm) and greater than 90-degree engagement with strike to prevent door and frame separation under high static load.
 - e) Bottom Latchbolt: Minimum of 0.44-inch (11 mm) engagement with strike.
 - f) Product Cycle Life: 1,000,000 cycles.
 - g) Latch Operation: Top and bottom latch operate independently of each other. Top latch fully engages top strike even when bottom latch is compromised. Separate trigger mechanisms not permitted.
 - h) Latch release does not require separate trigger mechanism.
 - i) Cable and latching system characteristics:
 - i. Installed independently of exit device installation, and capable of functioning on door prior to device and trim installation.

- ii. Connected to exit device at single point in steel and aluminum doors, and two points for top and bottom latches in wood doors.
- iii. Bottom latch height adjusted, from single point for steel and aluminum doors and two points for wood doors, after system is installed and connected to exit device, while door is hanging
- iv. Bottom latch position altered up and down minimum of 2 inches (51 mm) in steel and aluminum doors without additional adjustment. Bottom latch deadlocks in every adjustment position in wood doors.
- v. Top and bottom latches in steel and aluminum doors and top latch in wood doors may be removed while door is hanging.

2.06 ELECTRIC STRIKES

A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
 - a. Von Duprin 6000 Series
- 2. Acceptable Manufacturers and Products:
 - a. Substitutions by official Division 01 request only

B. Requirements:

- 1. Provide electric strikes designed for use with type of locks shown at each opening.
- 2. Provide electric strikes UL Listed as burglary-resistant.
- 3. Where required, provide electric strikes UL Listed for fire doors and frames.
- 4. Provide transformers and rectifiers for each strike as required. Verify voltage with electrical contractor.

2.07 CYLINDERS

A. Manufacturers and Products:

- 1. Scheduled Manufacturer and Product:
 - a. Schlage Everest 29 S
- 2. Acceptable Manufacturers and Products:
 - a. Substitutions by official Division 01 request only

B. Requirements:

- 1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
- 2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
 - a. Patented Open: cylinder with permanent core with open keyway.
- 3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
- 4. Nickel silver bottom pins.

2.08 KEYING

A. Requirements:

1. Permanent Keying:
 - a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - 1) Master Keying system as directed by the Owner.
 - b. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 - c. Provide keys with the following features:
 - 1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 - 2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
 - d. Identification:
 - 1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
 - 2) Identification stamping provisions must be approved by the Architect and Owner.
 - 3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
 - 4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
 - 5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 - e. Quantity: Furnish in the following quantities.
 - 1) Change (Day) Keys: 3 per cylinder/core.
 - 2) Master Keys: 6.

2.09 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Telkee
2. Acceptable Manufacturers:
 - a. Substitutions by official Division 01 request only

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.10 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN 4010/4110/4020 series

2. Acceptable Manufacturers and Products:
 - a. Substitutions by official Division 01 request only

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. Certify surface mounted mechanical closers to meet fifteen million (15,000,000) full load cycles. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cast iron cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers. When closers are parallel arm mounted, provide closers which mount within 6-inch (152 mm) top rail without use of mounting plate so that closer is not visible through vision panel from pull side.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI/BHMA Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.11 ELECTRO-MECHANICAL AUTOMATIC OPERATORS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
 - a. LCN Senior Swing
2. Acceptable Manufacturers and Products:
 - a. Substitutions by official Division 01 request only

B. Requirements:

1. Provide low energy automatic operator units that are electro-mechanical design complying with ANSI/BHMA A156.19.
 - a. Opening: Powered by DC motor working through reduction gears.
 - b. Closing: Spring force.
 - c. Manual, hydraulic, or chain drive closers: Not permitted.
 - d. Operation: Motor is off when door is in closing mode. Door can be manually operated with power on or off without damage to operator. Provide variable adjustments, including opening and closing speed adjustment.
 - e. Cover: Aluminum.

2. Provide units with manual off/auto/hold-open switch, push and go function to activate power operator, vestibule interface delay, electric lock delay, hold-open delay adjustable from 1 to 32 seconds, and logic terminal to interface with accessories, mats, and sensors.
3. Provide drop plates, brackets, and adapters for arms as required to suit details.
4. Provide motion sensors and/or actuator switches, and receivers for operation as specified. Provide weather-resistant actuators at exterior applications.
5. Provide key switches, with LED's, recommended and approved by manufacturer of automatic operator as required for function as described in operation description of hardware sets. Cylinders: Refer to "KEYING" article, herein.
6. Provide complete assemblies of controls, switches, power supplies, relays, and parts/material recommended and approved by manufacturer of automatic operator for each individual leaf. Actuators control both doors simultaneously at pairs. Sequence operation of exterior and vestibule doors with automatic operators to allow ingress or egress through both sets of openings as directed by Architect. Locate actuators, key switches, and other controls as directed by Architect.

2.12 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Substitutions by official Division 01 request only

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.13 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Ives
2. Acceptable Manufacturers:
 - a. Substitutions by official Division 01 request only

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.
2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.14 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
 - a. Glynn-Johnson
 2. Acceptable Manufacturers:
 - a. Substitutions by official Division 01 request only
- B. Requirements:
1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.
 2. Provide friction type at doors without closer and positive type at doors with closer.

2.15 DOOR STOPS AND HOLDERS

- A. Manufacturers:
1. Scheduled Manufacturer:
 - a. Ives
 2. Acceptable Manufacturers:
 - a. Substitutions by official Division 01 request only
- B. Provide door stops at each door leaf:
1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
 2. Where a wall stop cannot be used, provide universal floor stops.
 3. Where wall or floor stop cannot be used, provide overhead stop.
 4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.16 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

- A. Manufacturers:
1. Scheduled Manufacturer:
 - a. Zero International
 2. Acceptable Manufacturers:
 - a. Substitutions by official Division 01 request only
- B. Requirements:
1. Provide thresholds, weather-stripping, and gasketing systems as specified and per architectural details. Match finish of other items.
 2. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 3. Provide door sweeps, seals, astragals, and auto door bottoms only of type where resilient or flexible seal strip is easily replaceable and readily available.
 4. Size thresholds 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width unless otherwise specified in the hardware sets or detailed in the drawings.

2.17 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
 - a. Schlage
2. Acceptable Manufacturers:
 - a. Substitutions by official Division 01 request only

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.18 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
3. Protection Plates: BHMA 630 (US32D)
4. Overhead Stops and Holders: BHMA 630 (US32D)
5. Door Closers: Powder Coat to Match
6. Wall Stops: BHMA 630 (US32D)
7. Weatherstripping: Clear Anodized Aluminum
8. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 2. Custom Steel Doors and Frames: HMMA 831.

3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
 4. Installation Guide for Doors and Hardware: DHI TDH-007-20
- B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.
- C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.
- I. Lock Cylinders:
1. Install construction cores to secure building and areas during construction period.
 2. Replace construction cores with permanent cores as indicated in keying section.
 3. Furnish permanent cores to Owner for installation.
- J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:
1. Conduit, junction boxes and wire pulls.
 2. Connections to and from power supplies to electrified hardware.
 3. Connections to fire/smoke alarm system and smoke evacuation system.
 4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
 5. Connections to panel interface modules, controllers, and gateways.
 6. Testing and labeling wires with Architect's opening number.
- K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- L. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.
- M. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- N. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

- O. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- P. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- Q. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- R. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- S. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Spring Hinges: Adjust to achieve positive latching when door can close freely from an open position of 30 degrees.
 - 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - 3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items per manufacturer's instructions to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

- A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

CDA - Village on Park Parking Structure and Site Improvements

- B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.
- C. Hardware items are referenced in the following hardware schedule. Refer to the above specifications for special features, options, cylinders/keying, and other requirements.
- D. Hardware Sets:

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Hardware Group No. 01

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	STOREROOM LOCK	ND80P6D RHO	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE CON 12/16/24/28 VAC/VDC	630	VON
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	CREDENTIAL READER	BY DIVISION 28		B/O
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE AND SHUNT ANY ALARM ASSOCIATED WITH THE DOOR CONTACT ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE.

ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER:
CREDENTIAL READER DEVICE.

REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE AND THE DOOR CONTACT.

Hardware Group No. 02

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96P6D RHO	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

MONITOR ONLY.

ITEMS TO BE PROVIDED BY DIVISION 28 SUPPLIER:
REQUIRED POWER AND WIRING TO THE DOOR CONTACT.

CDA - Village on Park Parking Structure and Site Improvements

Hardware Group No. 03

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96P6D RHO	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

MONITOR ONLY.

ITEMS TO BE PROVIDED BY DIVISION 28 SUPPLIER:
REQUIRED POWER AND WIRING TO THE DOOR CONTACT.

Hardware Group No. 04

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96P6D RHO	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	SET	GASKETING	328AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	566A-V3-223	A	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

MONITOR ONLY.

ITEMS TO BE PROVIDED BY DIVISION 28 SUPPLIER:
REQUIRED POWER AND WIRING TO THE DOOR CONTACT.

Hardware Group No. 05

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96P6D RHO	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE

CDA - Village on Park Parking Structure and Site Improvements

Hardware Group No. 06

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96P6D RHO	626	SCH
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

MONITOR ONLY.

ITEMS TO BE PROVIDED BY DIVISION 28 SUPPLIER:
REQUIRED POWER AND WIRING TO THE DOOR CONTACT.

Hardware Group No. 07

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	PANIC HARDWARE	99-L-BE-06	626	VON
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	SET	GASKETING	328AA-S	AA	ZER
1	EA	DOOR SWEEP	8198AA	AA	ZER
1	EA	THRESHOLD	566A-V3-223	A	ZER

Hardware Group No. 08

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1HW 5 X 4.5	630	IVE
2	EA	PANIC HARDWARE	3349A-L-BE-06-LBL	626	VON
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4111 EDA	689	LCN
2	EA	MOUNTING PLATE	4110-18	689	LCN
2	EA	BLADE STOP SPACER	4110-61	689	LCN
1	SET	MEETING STILE	8193AA-S	AA	ZER
1	EA	DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		B/O
1	EA	WEATHER STRIPPING	BY DOOR/FRAME MANUFACTURER		B/O
1	EA	THRESHOLD	BY DOOR/FRAME MANUFACTURER		B/O

CDA - Village on Park Parking Structure and Site Improvements

Hardware Group No. 09

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1HW 5 X 4.5	630	IVE
1	EA	REMOVABLE MULLION	5654B	628	VON
2	EA	PUSH/PULL BAR	9190EZHD-10"-NO	630-316	IVE
1	EA	OH STOP	100S LHR	630	GLY
1	EA	OH STOP	100SE RHR	630	GLY
1	EA	SURFACE CLOSER	4011 LHR	689	LCN
1	EA	SURF. AUTO OPERATOR	9531 MS AS REQ (120/240 VAC) RHR	ANCLR	LCN
1	EA	MOUNTING PLATE	4010-18	689	LCN
2	EA	ACTUATOR, TOUCH	8310-853T	630	LCN
1	SET	MEETING STILE	8193AA-S	AA	ZER
1	EA	DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		B/O
1	EA	WEATHER STRIPPING	BY DOOR/FRAME MANUFACTURER		B/O
1	EA	THRESHOLD	BY DOOR/FRAME MANUFACTURER		B/O

BOTH ACTUATORS ALWAYS ACTIVE.

POWER FOR AUTO OPERATOR BY ELECTRICAL CONTRACTOR.

CDA - Village on Park Parking Structure and Site Improvements

Hardware Group No. 10

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
8	EA	HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	TWO-POINT DEADLATCH WITH PADDLE	4781	628	ADA
1	EA	MORTISE CYLINDER	20-001 118 36-083	626	SCH
2	EA	PUSH/PULL BAR	9190EZHD-10"-NO	630-316	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4111 EDA	689	LCN
2	EA	MOUNTING PLATE	4110-18	689	LCN
2	EA	BLADE STOP SPACER	4110-61	689	LCN
1	SET	MEETING STILE	8193AA-S	AA	ZER
1	EA	DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		B/O
1	EA	WEATHER STRIPPING	BY DOOR/FRAME MANUFACTURER		B/O
1	EA	THRESHOLD	BY DOOR/FRAME MANUFACTURER		B/O
2	EA	DOOR CONTACT	679-05HM	BLK	SCE

MONITOR ONLY.

ITEMS TO BE PROVIDED BY DIVISION 28 SUPPLIER:
REQUIRED POWER AND WIRING TO THE DOOR CONTACTS.

Hardware Group No. 11

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	99-L-NL-06	626	VON
1	EA	RIM CYLINDER	20-022	626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC	630	VON
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	CREDENTIAL READER	BY DIVISION 28		B/O
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE AND SHUNT ANY ALARM ASSOCIATED WITH THE DOOR CONTACT ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE.

ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER:
CREDENTIAL READER DEVICE.
REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE AND THE DOOR CONTACT.

CDA - Village on Park Parking Structure and Site Improvements

Hardware Group No. 12

Provide each PR door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
6	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	FIRE EXIT HARDWARE	9949-EO-F	626	VON
1	EA	FIRE EXIT HARDWARE	9949-L-NL-F-06	626	VON
1	EA	RIM CYLINDER	20-022	626	SCH
2	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	SET	MEETING STILE	328AA-S	AA	ZER
2	EA	DOOR CONTACT	679-05HM	BLK	SCE

MONITOR ONLY.

ITEMS TO BE PROVIDED BY DIVISION 28 SUPPLIER:
REQUIRED POWER AND WIRING TO THE DOOR CONTACTS.

Hardware Group No. 13

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	FIRE EXIT HARDWARE	99-L-NL-F-06	626	VON
1	EA	RIM CYLINDER	20-022	626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE 12/24 VAC/VDC	630	VON
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	GASKETING	188SBK PSA	BK	ZER
1	EA	CREDENTIAL READER	BY DIVISION 28		B/O
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE AND SHUNT ANY ALARM ASSOCIATED WITH THE DOOR CONTACT ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE.

ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER:
CREDENTIAL READER DEVICE.
REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE AND THE DOOR CONTACT.

CDA - Village on Park Parking Structure and Site Improvements

Hardware Group No. 14

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	33A-EO	626	VON
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4111 EDA	689	LCN
1	EA	MOUNTING PLATE	4110-18	689	LCN
1	EA	BLADE STOP SPACER	4110-61	689	LCN
1	EA	DOOR SWEEP	BY DOOR/FRAME MANUFACTURER		B/O
1	EA	WEATHER STRIPPING	BY DOOR/FRAME MANUFACTURER		B/O
1	EA	THRESHOLD	BY DOOR/FRAME MANUFACTURER		B/O

Hardware Group No. 15

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96P6D RHO	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE CON 12/16/24/28 VAC/VDC	630	VON
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	CREDENTIAL READER	BY DIVISION 28		B/O
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE AND SHUNT ANY ALARM ASSOCIATED WITH THE DOOR CONTACT ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE.

ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER:

CREDENTIAL READER DEVICE.

REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE AND THE DOOR CONTACT.

CDA - Village on Park Parking Structure and Site Improvements

Hardware Group No. 16

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96P6D RHO	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE CON 12/16/24/28 VAC/VDC	630	VON
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	CREDENTIAL READER	BY DIVISION 28		B/O
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE AND SHUNT ANY ALARM ASSOCIATED WITH THE DOOR CONTACT ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE.

ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER:

CREDENTIAL READER DEVICE.

REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE AND THE DOOR CONTACT.

Hardware Group No. 17

Provide each SGL door(s) with the following:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1 4.5 X 4.5	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96P6D RHO	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE CON 12/16/24/28 VAC/VDC	630	VON
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	CREDENTIAL READER	BY DIVISION 28		B/O
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

CREDENTIAL READER DEVICE IS TO RELEASE THE ELECTRIC STRIKE AND SHUNT ANY ALARM ASSOCIATED WITH THE DOOR CONTACT ALLOWING THE DOOR TO BE OPENED. IMMEDIATE EGRESS IS ALWAYS AVAILABLE. KEYED INGRESS IS ALSO AVAILABLE.

ITEMS TO BE PROVIDED BY THE DIVISION 28 SUPPLIER:

CREDENTIAL READER DEVICE.

REQUIRED POWER AND WIRING TO THE ELECTRIC STRIKE AND THE DOOR CONTACT.

END OF SECTION

**SECTION 088000
GLAZING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds.

1.02 RELATED REQUIREMENTS

- A. Section 088813 - Fire-Rated Glazing.

1.03 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures.
- D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants.
- H. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.
- I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
- J. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
- K. GANA (SM) - GANA Sealant Manual.
- L. NFRC 100 - Procedure for Determining Fenestration Product U-factors.
- M. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
- N. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.

1.04 SUBMITTALS

- A. Product Data on Insulating Glass Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- C. Samples: Submit two samples 12 by 12 inch in size of glass units.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
 1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.
 - a. Insulating Glass Certification Council (IGCC).
 - b. Safety Glazing Certification Council (SGCC).
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

1.07 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.08 WARRANTY

- A. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Float Glass Manufacturers:
 1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
 2. Guardian Glass, LLC: www.guardianglass.com/#sle.
 3. Pilkington North America Inc: www.pilkington.com/na/#sle.
 4. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
- B. Bird-Friendly Glass Manufacturers:
 1. Guardian Glass, LLC: www.guardianglass.com/#sle.
 2. ORNILUX Bird Protection Glass, developed by ARNOLD GLAS: www.ornilux.com/#sle.
 3. Saint Gobain North America: www.saint-gobain.com/#sle.
 4. Walker Glass Company Ltd: www.walkerglass.com/#sle.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Design Pressure: Calculated in accordance with ASCE 7.
 - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 4. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
 - 2. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
 - 3. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

2.04 INSULATING GLASS UNITS

- A. Manufacturers:
 - 1. Cardinal Glass Industries: www.cardinalcorp.com/#sle.
 - 2. Guardian Glass, LLC: www.guardianglass.com/#sle.
 - 3. Pilkington North America Inc: www.pilkington.com/na/#sle. Pilkington North America Inc : www.pilkington.com/na/#sle.
 - 4. Viracon, Apogee Enterprises, Inc: www.viracon.com/#sle.
 - 5. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
- B. Fabricator: Certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
- C. Insulating Glass Units: Types as indicated.
 - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 - 3. Metal-Edge Spacers: Aluminum, bent and soldered corners.
 - 4. Spacer Color: Black.
 - 5. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
 - b. Color: Black.
 - 6. Purge interpane space with dry air, hermetically sealed.

2.05 BASIS OF DESIGN - INSULATING GLASS UNITS

- A. Basis of Design - Insulating Glass Units: Vision glazing, with low-e coating.

1. Applications: Exterior insulating glass glazing unless otherwise indicated.
2. Space between lites filled with argon.
3. Total Thickness: 1 inch.
4. Basis of Design - Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
5. Outboard Lite: Heat-strengthened float glass, 1/4 inch thick, minimum.
 - a. Low-E Coating: Vitro Architectural Glass (formerly PPG Glass) Solarban 90 on #2 surface.
 - b. Glass Tint: Solargray (light-gray).
6. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
 - a. Glass: Clear.
7. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of another acceptable manufacturer.

2.06 GLAZING UNITS

- A. Monolithic Interior Vision Glazing:
 1. Applications: Interior glazing unless otherwise indicated.
 2. Glass Type: Fully tempered float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch, nominal.
- B. Bird-Friendly Acid-Etched Glass: Etched patterns on glass as full-surface bird protection.
 1. Applications: As indicated on drawings.
 2. Glass Type: Insulating; tempered safety glass.
 3. Glass Color: Ultra-clear glass.
 4. Glass Panel Thickness: As required for application.
 5. Bird-Friendly Pattern:
 - a. Acid-etched on exterior, Surface 1, of IGU.
 6. Glass Size: As indicated on drawings.

2.07 GLAZING COMPOUNDS

- A. Glazing Putty: Polymer modified latex recommended by manufacturer for outdoor use, knife grade consistency; gray color.
- B. Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- C. Polysulfide Sealant: Two component; chemical curing, nonsagging type; ASTM C920 Type M, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.
- D. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.08 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
- D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

- E. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that the minimum required face and edge clearances are being provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.
- E. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry immediately before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.05 INSTALLATION - DRY GLAZING METHOD (TAPE AND GASKET SPLINE GLAZING)

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Cut glazing tape to length; install on glazing pane. Seal corners by butting tape and sealing junctions with butyl sealant.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- D. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.

- E. Install removable stops without displacing glazing spline. Exert pressure for full continuous contact.
- F. Carefully trim protruding tape with knife.

3.06 INSTALLATION - DRY GLAZING METHOD (TAPE AND TAPE)

- A. Application - Interior Glazed: Set glazing infills from the interior of the building.
- B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
- C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- E. Place glazing tape on free perimeter of glazing in same manner described above.
- F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- G. Carefully trim protruding tape with knife.

3.07 INSTALLATION - WET GLAZING METHOD (SEALANT AND SEALANT)

- A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.
- B. Place setting blocks at 1/4 points and install glazing pane or unit.
- C. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inch intervals, 1/4 inch below sight line.
- D. Fill gaps between glazing and stops with silicone type sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
- E. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.08 INSTALLATION - PRESSURE GLAZED SYSTEMS

- A. Application - Exterior Glazed: Set glazing infills from exterior side of building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install pressure plates without displacing glazing gasket; exert pressure for full continuous contact.
- E. Install cover plate.

3.09 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.10 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

**SECTION 088813
FIRE-RATED GLAZING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire-rated glazing units.
- B. Glazing compounds.

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
- B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
- C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
- D. ASTM C1036 - Standard Specification for Flat Glass.
- E. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants.
- G. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- H. GANA (SM) - GANA Sealant Manual.
- I. ICC (IBC) - International Building Code.
- J. ITS (DIR) - Directory of Listed Products.
- K. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- L. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies.
- M. UL (DIR) - Online Certifications Directory.
- N. UL 9 - Standard for Fire Tests of Window Assemblies.
- O. UL 10B - Standard for Fire Tests of Door Assemblies.
- P. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.
- Q. UL 263 - Standard for Fire Tests of Building Construction and Materials.

1.03 SUBMITTALS

- A. Product Data on Glazing Unit Glazing Types: Provide structural, physical, and environmental characteristics, size limitations, special handling and installation requirements.
- B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.

- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.06 FIELD CONDITIONS

- A. Ambient Conditions: Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during, and 24 hours after installation of glazing compounds.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire-Resistance-Rated Glass:
 - 1. Manufacturers:
 - a. SAFTIFIRST, a division of O'Keeffe's Inc: www.safti.com/#sle.
 - b. Technical Glass Products: www.fireglass.com/#sle.
 - c. Vetrotech North America: www.vetrotechusa.com/#sle.
- B. Fire-Protection-Rated Glass:
 - 1. Manufacturers:
 - a. SAFTIFIRST, a division of O'Keeffe's Inc: www.safti.com/#sle.
 - b. SCHOTT North America Inc: www.us.schott.com/#sle.
 - c. Technical Glass Products: www.fireglass.com/#sle.
 - d. Vetrotech North America: www.vetrotechusa.com/#sle.

2.02 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
 - 2. Kind HS - Heat-Strengthened Type: Comply with ASTM C1048.
 - 3. Kind FT - Fully Tempered Type: Comply with ASTM C1048.

2.03 GLAZING UNITS

- A. Fire-Resistance-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and blocks radiant heat, as required to achieve indicated fire rating period exceeding 45 minutes.
 - 1. Applications:
 - a. Glazing in fire-rated door assembly.
 - b. Glazing in fire-rated window assembly.
 - c. Glazing in sidelites, borrowed lites, and other glazed openings in fire-rated wall assemblies.

2. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
 3. Safety Glazing Certification: 16 CFR 1201 Category II.
 4. Glazing Method: As required for fire rating.
 5. Fire Rating Period: As indicated on drawings.
 6. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on fire-resistance-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction.
 - a. "W" - meets wall assembly criteria of ASTM E119 or UL 263 fire test standards.
 - b. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
 - c. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire test standards.
 - d. "T" - meets temperature rise of not more than 450 degrees F above ambient at end of 30 minutes fire exposure in accordance with NFPA 252, UL 10B, or UL 10C fire test standards.
 - e. "XXX" - placeholder that represents fire rating period, in minutes.
- B. Fire-Protection-Rated Glazing: Type, thickness, and configuration of glazing that contains flame, smoke, and does not block radiant heat, as required to achieve indicated fire rating period of 90 minutes or less.
1. Applications:
 - a. Glazing in fire-resistance-rated door assembly.
 - b. Glazing in fire-resistance-rated window assembly.
 2. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
 3. Safety Glazing Certification: 16 CFR 1201 Category II.
 4. Glazing Method: As required for fire rating.
 5. Fire-Rating Period: As indicated on drawings.
 6. Markings for Fire-Protection-Rated Glazing Assemblies: Provide permanent markings on fire-protection-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction.
 - a. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
 - b. "OH" - meets fire window assembly criteria, including hose stream test of NFPA 257 or UL 9 fire test standards.
 - c. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire tests standards.
 - d. "XXX" - placeholder that represents fire-rating period, in minutes.

2.04 GLAZING COMPOUNDS

- A. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; color as selected.

2.05 ACCESSORIES

- A. Setting Blocks: Aluminum silicate, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape: Flexible tape made from spun calcium-magnesium-silica fibers in binder; designed to remain stable at temperatures up to 2,012 degrees F.

1. Thickness: As recommended by framing manufacturer for glazing application.
- D. Glazing Gaskets: Flexible intumescent seals.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that minimum required face and edge clearances are provided.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- D. Verify that sealing between joints of glass framing members has been completed effectively.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry immediately before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION - GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers unless more stringent requirements are indicated, including those in referenced glazing standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with contaminating substances that may result from construction operations including, but not limited to weld spatter, fire-safing, plastering, mortar droppings, etc.

3.04 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than four days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.05 PROTECTION

- A. After installation, mark pane with 'X' by using removable plastic tape or paste; do not mark heat-absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION

**SECTION 092116
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Metal channel ceiling framing.
- C. Acoustic insulation.
- D. Gypsum wallboard.
- E. Joint treatment and accessories.

1.02 REFERENCE STANDARDS

- A. AISI S201 - North American Standard for Cold-Formed Steel Framing - Product Data.
- B. AISI S220 - North American Standard for Cold-Formed Steel Nonstructural Framing.
- C. AISI S240 - North American Standard for Cold-Formed Steel Structural Framing.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- F. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
- G. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- H. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- I. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
- J. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
- K. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- L. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- M. ASTM C1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- N. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
- O. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
- P. GA-216 - Application and Finishing of Gypsum Panel Products.
- Q. GA-226 - Application of Gypsum Board to Form Curved Surfaces.
- R. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.

1.03 SUBMITTALS

- A. Product Data:
 - 1. Provide data on metal framing, gypsum board, accessories, and joint finishing system.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Store gypsum products and accessories indoors and keep above freezing. Elevate boards above floor, on nonwicking supports, in accordance with manufacturer's recommendations.
- B. Store metal products to prevent corrosion, under cover and above grade.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
 - 1. See PART 3 for finishing requirements.

2.02 METAL FRAMING MATERIALS

- A. Material and Product Requirements Criteria: AISI S201.
- B. Steel Sheet: ASTM A1003/A1003M, subject to the ductility limitations indicated in AISI S240.
 - 1. Corrosion Protection Coating Designation: G40 in accordance with AISI S220.
- C. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 - 1. Studs: "C" shaped.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Ceiling Channels: C-shaped.
 - 4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
 - 5. Furring Members: U-shaped sections, minimum depth of 3/4 inch.
 - 6. Furring Members: Zee-shaped sections, minimum depth of 1 inch.
 - 7. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
- D. Partition Head To Structure Connections: Provide track fastened to structure with legs of sufficient length to accommodate deflection, for friction fit of studs cut short.
- E. Non-structural Framing Accessories:
 - 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
 - a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.

2.03 BOARD MATERIALS

- A. Manufacturers - Gypsum-Based Board:
 1. CertainTeed Corporation: www.certainteed.com/#sle.
 2. Georgia-Pacific Gypsum: www.gpgypsum.com/#sle.
 3. National Gypsum Company: www.nationalgypsum.com/#sle.
 4. USG Corporation: www.usg.com/#sle.
- B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 - a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
 - b. Mold resistant board is required in toilet and shower rooms.
 3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 4. Thickness:
 - a. Vertical Surfaces: 5/8 inch.
 - b. Ceilings: 5/8 inch.

2.04 GYPSUM BOARD ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3-1/2 inch.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
 1. Products:
 - a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: www.titebond.com/#sle.
 - b. Specified Technologies Inc; Smoke N Sound Acoustical Sealant: www.stifirestop.com/#sle.
- C. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, unless noted otherwise.
 1. Corner Beads: Standard profile, for 90 degree outside corners.
 - a. Products:
 - 1) CertainTeed Corporation; No-Coat Drywall Corner: www.certainteed.com/#sle.
 - 2) ClarkDietrich; Strait-Flex Big-Stick: www.clarkdietrich.com/#sle.
 - 3) Trim-Tex, Inc; Corner Bead: www.trim-tex.com/#sle.
 2. L-Trim with Tear-Away Strip: Sized to fit 5/8 inch thick gypsum wallboard.
 3. Expansion Control Joints:
 - a. Fire-Resistance Rated: 1 or 2 hour as indicated when joint system tested in accordance with UL 2079.
 - b. Type: V-shaped PVC with tear away fins.
 - c. Products:
 - 1) Phillips Manufacturing Co; 093 Expansion Control Joint: www.phillipsmfg.com/#sle.
 - 2) Trim-Tex, Inc; Fire Rated 093V Expansion Bead: www.trim-tex.com/#sle.
 - 3) Or approved equal.

- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
 - 1. Paper Tape: 2 inch wide, creased paper tape for joints and corners.
 - 2. Joint Compound: Drying type, vinyl-based, ready-mixed.
- E. Finishing Compound: Surface coat and primer, takes the place of skim coating.
- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- G. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.
- H. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with AISI S220 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Laterally brace entire suspension system.
- C. Studs: Space studs at 16 inches on center.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 - 3. Partitions Terminating at Structure: Attach extended leg top runner to structure, maintain clearance between top of studs and structure, and brace both flanges of studs with continuous bridging.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.
- E. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
 - 1. Place one bead continuously on substrate before installation of perimeter framing members.
 - 2. Place continuous bead at perimeter of each layer of gypsum board.
 - 3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.04 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations. Stagger butt end joints.
- B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Fire-Resistance-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

- D. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of nonrated double-layer assemblies, which may be installed by means of adhesive lamination.
- E. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Expansion Control Joints: Place expansion control joints consistent with lines of building spaces and as follows:
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.06 JOINT TREATMENT

- A. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- B. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 2. Level 3: Walls to receive textured wall finish.
 - 3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
 - 4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling, and sanding are not required at base layer of double-layer applications.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

**SECTION 099000
PAINTING AND COATING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Interior painting and coating systems.
- C. Exterior painting and coating systems.
- D. Scope:
 - 1. Finish surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - a. Exterior:
 - 1) Concrete: Cementitious siding, Flexboard, Transite, non-roof shingles, common brick, stucco, tilt-up, precast, and poured-in-place cement.
 - 2) Masonry: Concrete masonry units (CMU), cinder or concrete block.
 - 3) Metal, Miscellaneous: Iron, ornamental iron, structural iron and steel, ferrous metal.
 - b. Interior:
 - 1) Concrete, Walls and Ceilings: Poured concrete, precast concrete, unglazed brick, cement board, tilt-up, cast-in-place concrete, and plaster.
 - 2) Masonry CMU: Concrete, split face, scored, smooth, high density, low density, and fluted.
 - 3) Metal: Structural steel columns, joists, trusses, beams, miscellaneous and ornamental iron, structural iron, and ferrous metal.
 - 4) Drywall: Walls, ceilings, gypsum board, and similar items.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.
- B. SSPC-SP 1 - Solvent Cleaning.
- C. SSPC-SP 2 - Hand Tool Cleaning.
- D. SSPC-SP 6 - Commercial Blast Cleaning.
- E. SSPC-SP 13 - Surface Preparation of Concrete.

1.03 SUBMITTALS

- A. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Product characteristics.
 - 2. Surface preparation instructions and recommendations.
 - 3. Primer requirements and finish specification.
 - 4. Storage and handling requirements and recommendations.
 - 5. Application methods.
 - 6. Clean-up information.
- B. Samples: Submit four paper draw down samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
- C. Maintenance Data: Submit coating maintenance manual including finish schedule showing where each product/color/finish was used, product technical data sheets, care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
2. Label each container with color in addition to manufacturer's label.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 3 years experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, product name, product code, color designation, VOC content, batch date, environmental handling, surface preparation, application, and use instructions.
- C. Paint Materials: Store at a minimum of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when environmental conditions are outside the ranges required by manufacturer.
- B. Follow manufacturer's recommended procedures for producing the best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design Products: Subject to compliance with requirements, provide Sherwin-Williams Company (The) products indicated; www.sherwin-williams.com/#sle.
- B. Comparable Products: Products of approved manufacturers will be considered in accordance with 016000 - Product Requirements, and the following:

1. Products are approved by manufacturer in writing for application specified.
2. Products that meet or exceed performance and physical characteristics of basis of design products.
3. Other Acceptable Manufacturers:
 - a. Benjamin Moore.
 - b. Diamond Vogel Paints.
 - c. Hallman Lindsay.
 - d. PPG Paints.

2.02 PAINTINGS AND COATINGS

- A. General:
 1. Provide factory-mixed coatings unless otherwise indicated.
 2. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application.
 3. Do not reduce, thin, or dilute coatings or add materials to coatings unless specifically indicated in manufacturer's instructions.
- B. Volatile Organic Compound (VOC) Content:
 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Ozone Transport Commission (OTC) Phase II Model Rule, Architectural and Industrial Maintenance Coatings; www.otcair.org.
 - c. Architectural coatings VOC limits of State in which the project is located.
 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site, or other method acceptable to authorities having jurisdiction.
- C. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Concrete: Cementitious siding, Flexboard, Transite, non-roof shingles, common brick, stucco, tilt-up, precast, and poured-in-place cement.
 1. Latex Systems:
 - a. Satin Finish:
 - 1) 1st Coat: Sherwin-Williams Loxon Concrete and Masonry Primer Sealer LX02W50: www.sherwin-williams.com/#sle.
(a) 5.3 to 8 mils wet, 2.1 to 3.2 mils dry.
 - 2) 2nd and 3rd Coat: Sherwin-Williams A-100 Exterior Latex Satin, A82 Series: www.sherwin-williams.com/#sle.
(a) 4 mils wet, 1.5 mils dry per coat.
- B. Masonry: Concrete masonry units (CMU), cinder or concrete block.
 1. Latex Systems:
 - a. Satin Finish:
 - 1) 1st Coat: Sherwin-Williams PrepRite Block Filler, B25W25: www.sherwin-williams.com/#sle.
(a) 75 to 125 sq ft/gal.
 - 2) 2nd and 3rd Coat: Sherwin-Williams A-100 Exterior Latex Satin, A82 Series: www.sherwin-williams.com/#sle.
(a) 4 mils wet, 1.5 mils dry per coat.
- C. Metal, Miscellaneous: Iron, ornamental iron, structural iron and steel, ferrous metal.
 1. Latex Systems:
 - a. Semi-Gloss Finish:

- 1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: www.sherwin-williams.com/#sle.
(a) 5 to 10 mils wet, 1.8 to 3.6 mils dry per coat.
- 2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Acrylic Semi-Gloss, B66-650 Series: www.sherwin-williams.com/#sle.
(a) 2 to 4 mils dry per coat.

2.04 PAINT SYSTEMS - INTERIOR

- A. Concrete, Walls and Ceilings: Poured concrete, precast concrete, unglazed brick, cement board, tilt-up, cast-in-place concrete, and plaster.
 1. Latex Systems:
 - a. Eg-Shel Finish:
 - 1) 1st Coat: Sherwin-Williams Loxon Concrete and Masonry Primer Sealer, LX02W50 Series: www.sherwin-williams.com/#sle.
(a) 8 mils wet, 3.2 mils dry per coat.
 - 2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20-2600 Series: www.sherwin-williams.com/#sle.
(a) 4 mils wet, 1.7 mils dry per coat.
- B. Masonry CMU: Concrete, split face, scored, smooth, high density, low density, and fluted.
 1. Latex Systems:
 - a. Eg-Shel/Satin Finish:
 - 1) 1st Coat: Sherwin-Williams PrepRite Block Filler, B25W25: www.sherwin-williams.com/#sle.
(a) 75 to 125 sq ft/gal.
 - 2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20-2600 Series: www.sherwin-williams.com/#sle.
(a) 4 mils wet, 1.7 mils dry per coat.
- C. Metal: Structural steel columns, joists, trusses, beams, miscellaneous and ornamental iron, structural iron, and ferrous metal.
 1. Alkyd Systems, Water Based:
 - a. Semi-Gloss Finish:
 - 1) 1st Coat: Sherwin-Williams Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series: www.sherwin-williams.com/#sle.
(a) 5 mils wet, 2 mils dry per coat.
 - 2) 2nd and 3rd Coat: Sherwin-Williams Pro Industrial Water Based Alkyd Urethane Enamel Semi-Gloss, B53-1150 Series: www.sherwin-williams.com/#sle.
(a) 4 to 5 mils wet, 1.4 to 1.7 mils dry per coat.
- D. Drywall: Walls, ceilings, gypsum board, and similar items.
 1. Latex Systems:
 - a. Eg-Shel Finish: Walls.
 - 1) 1st Coat: Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W2600: www.sherwin-williams.com/#sle.
(a) 4 mils wet, 1.5 mils dry per coat.
 - 2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Eg-Shel, B20-2600 Series: www.sherwin-williams.com/#sle.
(a) 4 mils wet, 1.7 mils dry per coat.
 - b. Flat Finish: Ceilings.
 - 1) 1st Coat: Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer, B28W2600: www.sherwin-williams.com/#sle.
(a) 4 mils wet, 1.5 mils dry per coat.
 - 2) 2nd and 3rd Coat: Sherwin-Williams ProMar 200 Zero VOC Latex Flat, B30-2600 Series: www.sherwin-williams.com/#sle.
(a) 4 mils wet, 1.6 mils dry per coat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove mildew from impervious surfaces by scrubbing with solution of water and bleach. Rinse with clean water and allow surface to dry.
- D. Concrete:
 - 1. Remove release agents, curing compounds, efflorescence, and chalk.
 - 2. Fill bug holes, air pockets, and other voids with cement patching compound.
 - 3. Prepare concrete according to SSPC-SP 13.
- E. Masonry: Remove efflorescence and chalk.
- F. Gypsum Board: Fill minor defects with filler compound; sand smooth and remove dust prior to painting.
- G. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- H. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Prime bare steel surfaces.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended by paint manufacturer and blast cleaning according to SSPC-SP 6. Protect from corrosion until coated.

3.03 APPLICATION

- A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
- B. Apply products in accordance with manufacturer's written instructions.
- C. Apply coatings at spread rate required to achieve manufacturer's recommended dry film thickness.
- D. Regardless of number of coats specified, apply additional coats until complete hide is achieved.

3.04 PRIMING

- A. Apply primer to all surfaces unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.
- B. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to top coat manufacturers.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Clean surfaces immediately of overspray, splatter, and excess material.

- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.06 PROTECTION

- A. Protect finished coatings from damage until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

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**SECTION 099113
EXTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Materials for backpriming woodwork.
- D. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
- E. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Non-metallic roofing and flashing.
 - 6. Stainless steel, anodized aluminum, bronze, terne-coated stainless steel, zinc, and lead.
 - 7. Marble, granite, slate, and other natural stones.
 - 8. Floors, unless specifically indicated.
 - 9. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
 - 10. Exterior insulation and finish system (EIFS).
 - 11. Glass.
 - 12. Concrete masonry units in utility, mechanical, and electrical spaces.
 - 13. Concealed pipes, ducts, and conduits.

1.02 DEFINITIONS

- A. Comply with ASTM D16 for interpretation of terms used in this section.

1.03 REFERENCE STANDARDS

- A. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating 2005 (Reapproved 2017).
- B. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.
- C. SSPC-SP 13 - Surface Preparation of Concrete 2018.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.
 - 5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
- C. Manufacturer's Instructions: Indicate special surface preparation procedures.
- D. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets

(MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - 2. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - a. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 5 years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the paint product manufacturer's temperature ranges.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready-mixed, unless required to be a field-catalyzed paint.
 - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is described explicitly in manufacturer's product instructions.
- B. Flammability: Comply with applicable code for surface burning characteristics.
- C. Colors: As indicated in Color Schedule.
 - 1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
 - 2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.02 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including concrete.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): Exterior Light Industrial Coating, Water Based; MPI #161, 163, or 164.
- B. Paint CE-OP-2L - Masonry/Concrete, Opaque, Latex, 3 Coat:
 - 1. One guide coat acrylic bonding conditioner.
 - 2. One coat of block filler.
 - 3. Flat: Two coats of latex enamel.
- C. Paint E-Pav - Pavement Marking Paint:
 - 1. Yellow: One coat, with reflective particles.

2.03 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Alkali Resistant Water Based Primer; MPI #3.
 - 2. Interior/Exterior Latex Block Filler; MPI #4.
 - 3. Acrylic Surface Conditioner.

2.04 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 2. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or repair existing paints or finishes that exhibit surface defects.
- D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- E. Seal surfaces that might cause bleed through or staining of topcoat.
- F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- G. Concrete:
 - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 2. Clean surfaces with pressurized water. Use pressure range of 1,500 to 4,000 psi at 6 to 12 inches. Allow to dry.
 - 3. Clean concrete according to ASTM D4258. Allow to dry.
 - 4. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.
- H. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.
- C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- D. Apply each coat to uniform appearance.
- E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.06 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

**SECTION 099600
HIGH-PERFORMANCE COATINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. High performance coatings.
- B. Surface preparation.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.
- B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating.
- C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.
- D. SSPC-SP 1 - Solvent Cleaning.
- E. SSPC-SP 2 - Hand Tool Cleaning.
- F. SSPC-SP 6 - Commercial Blast Cleaning.
- G. SSPC-SP 13 - Surface Preparation of Concrete.

1.03 SUBMITTALS

- A. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
 - 3. If proposal of substitutions is allowed under submittal procedures, explanation of all substitutions proposed.
- B. Samples: Submit two samples 8 by 8 inch in size illustrating colors available for selection.
- C. Maintenance Data: Include cleaning procedures and repair and patching techniques.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Coating Materials: 1 gallon of each type and color.
 - 2. Label each container with manufacturer's name, product number, color number, and room names and numbers where used.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.

- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Coating Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the coating product manufacturer.
- C. Do not install materials when temperature is below 55 degrees F or above 90 degrees F.
- D. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.
- E. Restrict traffic from area where coating is being applied or is curing.

PART 2 PRODUCTS

2.01 TOP COAT MATERIALS

- A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats specified does not include primer or filler coat.
 - 1. Volatile Organic Compound (VOC) Content:
 - a. Provide coatings that comply with the most stringent requirements specified in the following:
 - 1) 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings: www.otcair.org.
 - 1) Opaque, Flat: 50 g/L, maximum.
 - 2) Opaque, Nonflat: 150 g/L, maximum.
 - 3) Opaque, High Gloss: 250 g/L, maximum.
 - 4) Architectural coatings VOC limits of State in which the project is located.

2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- B. Colors: Selected from manufacturer's standard colors.
- C. Urethane Coating for Exposed Architectural Steel:
 1. Number of Coats: Two.
 2. Top Coat(s): Polyurethane, Two-Component.
 - a. Sheen: Semi-Gloss.
 - b. Products:
 - 1) PPG Paints; Pitthane High Build Urethane Enamel, 95-8800 Series, Semi-Gloss: www.ppgpaints.com/#sle.
 - 2) Sherwin-Williams; Acrolon 218 HS: www.protective.sherwin-williams.com/#sle.
 - 3) Tnemec Company, Inc; Series 1095 Endura-Shield: www.tnemec.com/#sle.
 3. Primer: As recommended by coating manufacturer for specific substrate.
- D. Graffiti-Resistant Coating for Concrete or Masonry:
 1. Number of Coats: One.
 2. Top Coat: Polysiloxane hybrid coating.
 - a. Sheen: Satin.
 - b. Products:
 - 1) Tex-Cote LLC; Graffiti Gard S: www.texcote.com/#sle.
- E. Shellac: Pure, white type.

2.02 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of coated surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not begin application of coatings until substrates have been properly prepared.
- C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Cementitious Substrates: Do not begin application until substrate has cured 28 days minimum and measured moisture content is not greater than 12 percent.
 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
- G. Proceed with coating application only after unacceptable conditions have been corrected.
 1. Commencing coating application constitutes Contractor's acceptance of substrates and conditions.

3.02 PREPARATION

- A. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.
- B. Clean surfaces of loose foreign matter.
- C. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.

- D. Remove finish hardware, fixture covers, and accessories and store.
- E. Concrete:
 - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 2. Prepare surface as recommended by coating manufacturer and according to SSPC-SP 13.
- F. Masonry:
 - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
 - 2. Prepare surface as recommended by coating manufacturer.
- G. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- H. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 - 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning", and protect from corrosion until coated.

3.03 PRIMING

- A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

3.04 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified.
- B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Clean surfaces immediately of overspray, splatter, and excess material.
- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

END OF SECTION

**SECTION 101423
PANEL SIGNAGE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Panel signage.

1.02 REFERENCE STANDARDS

- A. ADA Standards - 2010 ADA Standards for Accessible Design.
- B. ICC A117.1 - Accessible and Usable Buildings and Facilities.

1.03 SUBMITTALS

- A. Product Data: Manufacturer's product literature for each type of panel sign, indicating styles, font, foreground and background colors, locations, and overall dimensions of each sign.
- B. Shop Drawings:
 - 1. Include dimensions, locations, elevations, materials, text and graphic layout, attachment details, and schedules.
- C. Selection Samples: Where colors, materials, and finishes are not specified, submit two sets of color selection charts or chips.
- D. Verification Samples: Submit samples showing colors, materials, and finishes specified.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Package signs as required to prevent damage before installation.
- B. Store tape adhesive at normal room temperature.

1.07 FIELD CONDITIONS

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain minimum ambient temperature during and after installation.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Accessibility Requirements: Comply with ADA Standards and ICC A117.1 and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most restrictive requirements.

2.02 PANEL SIGNAGE

- A. Panel Signage:
 - 1. Application: Exit door signs.
 - 2. Description: Flat signs with engraved panel media, tactile characters.
 - 3. Sign Size: 4 inches by 6 inches.
 - 4. Total Thickness: 1/8 inch.
 - 5. Sign Edges: Squared.
 - 6. Letter Edges: Squared.
 - 7. Corners: Squared.
 - 8. Color and Font, unless otherwise indicated:
 - a. Character Font: Helvetica, Arial, or other sans serif font.
 - b. Character Case: Upper case only.
 - c. Background Color: As selected.
 - d. Character Color: Contrasting color.
 - 9. Material: Laminated colored plastic engraved through face to expose core as background color.
 - 10. Profile: Flat panel without frame.
 - 11. Tactile Letters: Raised 1/32 inch minimum.
 - 12. One-Sided Wall Mounting: Tape adhesive.

2.03 ACCESSORIES

- A. Tape Adhesive: Double-sided tape, permanent adhesive.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install with horizontal edges level.
- C. Locate panel signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.
- D. Protect from damage until substantial completion; repair or replace damaged items.

END OF SECTION

**SECTION 104400
FIRE PROTECTION SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Accessories.

1.02 REFERENCE STANDARDS

- A. FM (AG) - FM Approval Guide.
- B. NFPA 10 - Standard for Portable Fire Extinguishers.
- C. UL (DIR) - Online Certifications Directory.

1.03 SUBMITTALS

- A. Product Data: Provide extinguisher operational features, extinguisher ratings and classifications, color and finish, and anchorage details.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fire Extinguishers, Cabinets, and Accessories:
 - 1. Activar Construction Products Group - JL Industries: www.activarcpg.com/#sle.
 - 2. Kidde, a unit of United Technologies Corp: www.kidde.com/#sle.
 - 3. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
 - 4. Modern Metal Products.
 - 5. Nystrom, Inc: www.nystrom.com/#sle.
 - 6. Potter-Roemer: www.potterroemer.com/#sle.

2.02 FIRE EXTINGUISHERS

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
 - 1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
 - 1. Class: A:B:C type.
 - 2. Size: 10 pound.
 - 3. Finish: Baked polyester powder coat, color as selected.
 - 4. Temperature range: Minus 40 degrees F to 120 degrees F.

2.03 FIRE EXTINGUISHER CABINETS

- A. Cabinet Construction: Non-fire rated.
 - 1. Formed stainless steel sheet; 0.036 inch thick base metal.
- B. Fire Rated Cabinet Construction: One-hour fire rated.
 - 1. Steel; double wall or outer and inner boxes with 5/8 inch thick fire barrier material.
- C. Cabinet Configuration: Semi-recessed type.
 - 1. Size to accommodate accessories.
 - 2. Trim: Flat square edge, with 1-1/4 inch wide face.
 - 3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.
- D. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinges.
- E. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.
- F. Fabrication: Weld, fill, and grind components smooth.
- G. Finish of Cabinet Exterior Trim and Door: Red baked enamel.

2.04 ACCESSORIES

- A. Extinguisher Brackets: Formed steel, chrome-plated.
- B. Lettering: FIRE EXTINGUISHER decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure rigidly in place.
- C. Place extinguishers in cabinets and on wall brackets.

END OF SECTION

**SECTION 108213
EXTERIOR GRILLES AND SCREENS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Framed exterior fabric screens attached to structure.

1.02 REFERENCE STANDARDS

- A. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- D. ASTM F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.

1.03 SUBMITTALS

- A. Shop Drawings: Submit detailed shop drawings, indicating component profiles, sections, finishes, fastening details, special details, and manufacturer's technical and descriptive data.
 - 1. Include field dimensions of openings and elevations on shop drawings.
 - 2. Indicate distinction between factory-assembled and field-assembled work on shop drawings.
- B. Samples: Submit assembled sample 24 inches by 24 inches minimum size to illustrate design, fabrication techniques, workmanship, and finish color.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of documented experience.

- B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to project site in manufacturer's original, unopened packaging, with labels clearly identifying manufacturer and material.
- B. Store materials indoors, protected from moisture, humidity, and extreme temperature fluctuations.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a one year period after Date of Substantial Completion.
- C. Finish Warranty: Provide manufacturer's ten year warranty on factory finish against cracking, peeling, and blistering.

PART 2 PRODUCTS

2.01 SCREENS

- A. Fabric Screens: Provide shop fabricated, shop finished fabric screens assembled into panels, installed as solar protection over building facades, while maintaining outward visibility.
 - 1. Fabric Screening Material: Comply with applicable code for flame spread/smoke developed ratings for facade covering.
 - a. PVDF Coated Polyester: 16.2 oz/sq yd, resistant to ultraviolet light, mildew and water, flame resistant treated; color as selected.
 - 1) Custom Printing: Artwork to be provided by Architect.
 - 2) Basis of Design Product: FlexFacades by StructurFlex; Parking Garage Decorative Fabric Facade Screens or a comparable product by one of the following:
 - (a) Serge Ferrari: www.sergeferrari.com/#sle.
 - 2. Panel Size and Configuration: As indicated on drawings.
 - 3. Frame/Support: As indicated on drawings.

2.02 MATERIALS

- A. Aluminum Extrusions: ASTM B221 (ASTM B221M) alloy 6063, temper T5, 1/8 inch minimum wall thickness.
- B. Concealed Structural Supports: Aluminum, or steel coated for corrosion resistance and dissimilar metal isolation.

2.03 FABRICATION

- A. Shop fabricate grilles and screens to the greatest extent possible.
- B. Disassemble as necessary for shipping and handling, clearly mark units for proper reassembly.
- C. Provide supports, anchorages, and accessories as required for complete assembled system.
- D. Provide inserts as required for installation into concrete or masonry based support materials.

2.04 ACCESSORIES

- A. Fasteners: ASTM F593 stainless steel or ASTM A307 carbon steel, sizes to suit installation conditions.
- B. Anchors and Inserts: Corrosion resistant; type, size, and material required for loading and installation as indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.

- B. Verify that painting, roofing, masonry work, and other adjacent work that might damage grille finish have been completed prior to start of installation.
- C. Verify that anchorage devices have been properly installed and located.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's written installation instructions.
- B. Set grilles level, plumb, with uniform joints, and in alignment with adjacent work as indicated.
- C. Mechanically secure grilles to supporting structure.
- D. Do not cut or trim aluminum members without approval of manufacturer; do not install damaged members.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch.
- B. Maximum Offset From True Alignment: 1/8 inch.

3.04 CLEANING

- A. Clean finished surfaces as recommended by manufacturer and maintain clean condition until Date of Substantial Completion.
- B. Touch-up damaged finish coating using material provided by manufacturer to match original coating.

3.05 PROTECTION

- A. Protect installed grilles to ensure grilles are without damage until Date of Substantial Completion.

END OF SECTION

**SECTION 11 27 90
CAST-IN-PLACE RUBBER SURFACE**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Work includes:
 - 1. Cast-in-place (non-loose fill) playground surfacing system
 - 2. Furnishing and installing the Poured-In-Place (PIP) Safety Surface. The surfacing Manufacturer/installer shall be responsible for all labor, materials, tools, and equipment to perform all work and services for the installation of the surface.

1.02 RELATED SECTIONS

- A. Excavation, concrete paving
- B. Section 31 23 16 – Excavation
- C. Section 03 30 00 – Cast-In –Place Concrete

1.03 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
- B. Product Data: Submit manufacturer's product data and installation instructions.
- C. Verification Samples: Submit for each product indicated and for each color and texture required.
- D. Shop Drawings: Show materials, cross sections, and drainage.
 - 1. Show penetration details
 - 2. Show edge terminations
- E. Quality Assurance/Control Submittals: Submit the following:
 - 1. Certificate of qualifications of the playground surfacing installer.
 - 2. Product test reports
 - 3. Maintenance data
- F. Closeout Submittals: Submit the following:
 - 1. Warranty documents specified herein.

1.04 PRODUCT REQUIREMENTS

- A. Performance Requirements: Provide a two (2) layer rubber-polyurethane playground surfacing system which has been designed, manufactured and installed to meet the following criteria:
 - 1. Shock Attenuation (ASTM F1292):
 - a. Gmax: Less than 200.
 - b. Head Injury Criteria: Less than 1000.
 - 2. Flammability (ASTM D2859): Pass.
 - 3. Tensile Strength (ASTM D412): 60 psi (413 kPa).
 - 4. Tear Resistance (ASTM D624): 140%
 - 5. Water Permeability: 0.4 gal/yd²/second.
 - 6. Accessibility: Comply with requirements of ASTM F1951 and Americans with Disabilities Act.

1.05 QUALITY ASSURANCE

- A. Qualifications: Utilize an installer approved and trained by the manufacturer of the playground surfacing system, having at least 5 years' experience with other projects of the scope and scale of the work described in this section.
- B. Certifications: Certification by manufacturer that installer is an approved applicator of the playground surfacing system.
- C. International Play Equipment Manufacturers Association (IPEMA) certified.
- D. Standards and Guidelines: Provide playground surface systems complying with applicable provisions of the following, unless more stringent provisions are indicated:
 - 1. CPSC No. 325, "Handbook for Public Playground Safety"; ASTM F 1292 and ASTM F 1487.

1.06 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Delivery: Deliver materials in manufacturer's original unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at a minimum temperature of 40 degrees F and a maximum temperature of 90 degrees F.

1.07 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Install surfacing system when minimum ambient temperature is 33 degrees F and maximum ambient temperature is 90 degrees F. Do not install in steady or heavy rain.

1.08 PREINSTALLATION MEETINGS

- A. Pre-installation Conference: Conduct conference at Project site.

1.09 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with Division 1 Product Requirement Section.
- B. Delivery: Deliver materials in manufacturer's original unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at a minimum temperature of 40 degrees F and a maximum temperature of 90 degrees F.

1.10 PROJECT SITE CONDITIONS

- A. Synthetic safety surfacing shall be installed on a dry subsurface, with no prospect of rain within the initial drying period, at temperatures recommended by the Manufacturer.
- B. Installation in weather condition of extreme heat, temperatures less than 40-degrees (F), and/or high humidity may impact cure time, and/or the structural integrity of the final product. Immediate surroundings of the site shall be reasonably free of dust conditions and poor particulate air quality will impact the final surface look.
- C. The Manufacturer's installation manager shall reserve the right to control the project schedule installation based on such factors without penalty to No Fault Sport Group, LLC.
- D. Safety surfacing shall be installed after the playground equipment is installed unless otherwise noted.
- E. Surface installation shall be coordinated by the project manager of designated individual of playground equipment and sub-base installation, with No Fault Sport Group's local production manager and in accordance with No Fault's sub-base requirements.

1.11 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - 2. ASTM D624 Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers.
 - 3. ASTM D2047 Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
 - 4. ASTM D2859 Standard Test Method for Flammability of Finished Textile Floor Covering Materials.
 - 5. ASTM E303 Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester Equipment.
 - 6. ASTM F1292 Standard Specification for Impact Attenuation of Surface Systems Under and Around Playground Equipment.
 - 7. ASTM F1951 Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment.

1.12 WARRANTY

- A. Project Warranty: Refer to conditions of the contract for project warranty provisions.
- B. Manufacturer's Warranty: Submit, for owner's acceptance, manufacturer's standard warranty document executed by authorized company official. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under contract documents.
 - 1. Warranty Period: 5 years from date of completion of work.
- C. Surfacing shall maintain required impact attenuation characteristics and be guaranteed against defects in workmanship and materials for a period of no less than five (5) years

PART 2 - PRODUCTS

2.01 POURED-IN-PLACE PLAYGROUND SURFACING SYSTEM

- A. Manufacturer: Surface America, Inc. (or equal)
 - 1. Contact: Nutoys Leisure Products, Box 2121, LaGrange, Illinois 60525; Telephone: (708) 579-9055 or 1-800-526-6197
- B. Proprietary Products/Systems. Poured-in-place playground surfacing system, including the following:
 - 1. PlayBound Poured-In-Place Primer (or equal)
 - a. Material: Polyurethane
 - 2. PlayBound Poured-in-Place Basemat (or equal)
 - a. Material: Blend of 100% recycled SBR (styrene butadiene rubber) and polyurethane.
 - b. Thickness: The type of playground equipment determines the required basemat thickness, and the basemat thickness may be different at various locations on the playground site. Refer to ASTM F 1292 requirements for critical height and recommended basemat thickness and coordinate with plan drawings play equipment manufacturer's recommendations. Thickness 1" (25.4 mm), 1-1/2" (38 mm), 2" (51 mm), 2-1/2" (64 mm), 3-1/2" (89 mm), 4" (102 mm).
 - c. Formulation Components: Blend of strand and granular material.
 - 3. PlayBound Poured-In-Place Top Surface:
 - a. Material: Blend of recycled EPDM (ethylene propylene diene monomer) and polyurethane.

- b. Thickness Nominal ½" (12.7 mm), minimum 3/8" (9.5 mm), maximum 5/8" (15.9 mm).
- c. As specified on the construction drawings.
- d. Dry Static Coefficient of Friction (ASTM D2047): 1.0
- e. Wet Static: Coefficient of Friction (ASTM D2047): 0.9
- f. Dry Skid Resistance (ASTM E303): 89
- g. Wet Skid Resistance (ASTM E303): 5.7

2.02 PRODUCT SUBSTITUTIONS

- A. Substitutions: No substitutions permitted.

2.03 MIXES

- A. Required mix proportions by weight:
 - 1. Basemat: 14% polyurethane, 86% rubber.
 - 2. Top Surface: 18% polyurethane, 82% rubber.

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS

- A. Comply with the instructions and recommendations of the playground surfacing manufacturer.

3.02 EXAMINATION

- A. Site Verification of Conditions: Verify that substrate conditions are suitable for installation of the playground surfacing system.
- B. Do not proceed with installation until unsuitable conditions are corrected.

3.03 PREPARATION

- A. Surface Preparation: Using a brush or short nap roller, apply primer to the substrate perimeter and any adjacent vertical barriers such as playground equipment support legs, curbs or slabs that will contact the surfacing system at the rate of 300 ft²/gal.

3.04 INSTALLATION

- A. Concrete Substrates: Verify that substrates are dry, free from surface defects, and free of laitance, glaze, efflorescence, curing compounds, form-release agents, hardeners, dust, dirt, loose particles, grease, oil, and other contaminants incompatible with playground surface system or that may interfere with adhesive bond. Determine adhesion, dryness, and acidity characteristics by performing procedures recommended in writing by playground surface system manufacturer.
- B. Do not proceed with playground surfacing installation until unsatisfactory conditions of the substrate have been corrected and all applicable site work, including fencing, playground equipment installation and other relevant work, has been completed.
- C. Prepare substrate to receive surfacing products according to playground surface system manufacturer's written instructions. Verify that substrates are sound without high spots, ridges, holes, and depressions.
 - 1. Use trowelable leveling and patching materials, according to manufacturer's written instructions, to fill holes and depressions.
 - 2. Mechanically Scarify or otherwise prepare concrete substrates according to manufacturer's written instructions to achieve recommended degree of roughness.
 - 3. Saw cut concrete for terminal edges of seamless playground surface systems.
- D. Basemat Installation: Provide uniform, monolithic wearing surface and impact-attenuating system of a total thickness indicated. Prevent contamination during application and curing processes.

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1. Using screeds and hand trowels, install the basemat at a consistent density of 29 pounds, 10 ounce per cubic foot to the specified thickness.
 2. Basemat to be applied in one continuous operation, with a minimum of cold joints.
 3. Allow basemat to cure for sufficient time so that indentations are not left in the basemat from applicator foot traffic or equipment.
 4. Do not allow foot traffic or use of the basemat surface until it is sufficiently cured.
- E. Primer Application: Using a brush or short nap roller, apply primer to the basemat and any adjacent vertical barriers such as playground equipment support legs, curbs or slabs that will contact the surfacing system at the rate of 300 ft²/gal. – apply primer for maximum adherence to basemat.
- F. To Surface Installation:
1. Using a hand trowel, install top surface at a consistent density of 58 pounds, 9 ounces per cubic foot to form a level layer of uniform density and consistency, applied in one continuous operation, and, except where color changes with a minimum of cold joints. Finish surface to produce manufacturer's standard wearing-surface texture.
 - a. Where color pattern is indicated, place adjacent colored material as soon as placed colored material is sufficiently cured using primer or adhesive if required by manufacturer's written instructions.
- G. Edge Treatment: As indicated on the drawings and details. Fully adhere edges to substrate with full coverage of substrate. Maintain fully cushioned thickness.
- H. Provide protection to prevent traffic over system for not less than 48 hours after installation.
- I. At the end of the minimum curing period, verify that the top surface is sufficiently dry and firm to allow foot traffic and use without damage to the surface.
- J. Cleaning: During installation of adhesively applied products, immediately remove visible adhesive from surfaces. Use cleaner recommended by playground surface system manufacturer.

3.05 PROTECTION

- A. Protect the installed playground surface from damage resulting from subsequent construction activity on the site.

3.06 CLEAN UP

- A. Manufacturer's installers shall not leave adhesive on adjacent surface or play equipment. Spills of excess adhesive shall be promptly cleaned with materials and methods as recommended by the Manufacturer.
- B. Manufacturer's installers shall properly dispose of all material and packing waste before leaving the job site.
- C. Contractor shall be responsible for supplying a dumpster at job site for all waste associated with installation of the safety surface.

END OF SECTION

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**SECTION 12 93 00
SITE FURNISHINGS**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes:

1. Bike Rack

1.02 RELATED WORK

- A. The following section contains requirements that relate to this section:

1. Section 03 30 00 - Cast-in-Place Concrete
a. Concrete base and foundation construction.

1.03 REFERENCES STANDARDS

- A. ASTM A53/A53M: Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018
B. ASTM A123/A123M: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

1.04 SUBMITTALS

- A. Indicate detailed dimensions, base attachment details, and anchor requirements.
B. Product Data: Provide data on furnishing, equipment, accessories, and configurations.
C. Submit product information and manufacturer's installation recommendations for all site furnishings.

1.05 PRODUCT HANDLING AND STORAGE

- A. Protect all furnishings, equipment, and accessories from damage or moisture.
B. Replacements: In the event of damage to the site furnishings, immediately make all repairs or replacements necessary to the approval of the Owner and at all no additional cost to the Owner.

PART 2 PRODUCTS

2.01 BIKE RACK

- A. Manufacturer: Madrax
1080 Uniek Drive
Waunakee, WI 53597
Phone: (608) 849-1080
B. Model No: ORNS-2-SF (Orion Square Rack)
Surface Mount, Color: Black, Powder Coated
C. Or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install site furnishings as indicated on the Drawings.

3.02 EXAMINATION

- A. Verify site is ready to receive work and dimensions are as indicated on shop drawings and as required by manufacturer.
B. Owner and Landscape Architect reserves the right to make minor field adjustments to best fit the exact field conditions.

END OF SECTION

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**SECTION 142100
ELECTRIC TRACTION ELEVATORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electric traction elevator systems.
- B. Maintenance Contract.

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
- C. ADA Standards - 2010 ADA Standards for Accessible Design.
- D. AISC 360 - Specification for Structural Steel Buildings.
- E. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test.
- F. ASME A17.1 - Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters with Automatic Transfer Devices.
- G. ASME A17.2 - Guide for Inspection of Elevators, Escalators, and Moving Walks Includes Inspection Procedures for Electric Traction and Winding Drum Elevators, Hydraulic Elevators, Inclined Elevators, Limited-Use/Limited-Application Elevators, Private Residence Elevators, Escalators, Moving Walks, and Dumbwaiters.
- H. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- I. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes.
- J. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- K. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- L. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable.
- M. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- N. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric).
- O. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.
- P. AWS D1.1/D1.1M - Structural Welding Code - Steel.
- Q. ITS (DIR) - Directory of Listed Products.
- R. NEMA MG 1 - Motors and Generators.
- S. NFPA 13 - Standard for the Installation of Sprinkler Systems.
- T. NFPA 70 - National Electrical Code.
- U. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.
- V. UL (DIR) - Online Certifications Directory.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate work with other installers to provide necessary conduits for proper installation of wiring, including but not limited to, the following:

- a. Elevator equipment devices remote from elevator machine room or hoistway.
 - b. Elevator pit for lighting, sump pump, and ladder.
 - c. Fire alarm panel from controller cabinet.
- B. Preinstallation Meeting: Convene meeting at least one week prior to start of this work.
 - 1. Review schedule of installation, proper procedures and conditions, and coordination with related work.
- C. Construction Use of Elevator: Not permitted.

1.04 SUBMITTALS

- A. Product Data: Submit data on following items:
 - 1. Signal and operating fixtures, operating panels, and indicators.
 - 2. Car design, dimensions, layout, and components.
 - 3. Car and hoistway door and frame details.
 - 4. Electrical characteristics and connection requirements.
- B. Shop Drawings: Include appropriate plans, elevations, sections, diagrams, and details on following items:
 - 1. Elevator Equipment and Machines: Size and location of driving machines, power units, controllers, governors, and other components.
 - 2. Hoistway Components: Size and location of car machine beams, guide rails, buffers, ropes, and other components.
 - 3. Rail bracket spacing; maximum loads imposed on guide rails requiring load transfer to building structural framing.
 - 4. Clearances and over-travel of car and counterweight.
 - 5. Locations in hoistway of traveling cables and connections for car lighting and telephone.
 - 6. Location and sizes of hoistway and car doors and frames.
 - 7. Electrical characteristics and connection requirements.
 - 8. Recommended overcurrent protection for electrical circuit.
 - 9. Indicate arrangement of elevator equipment and allow for clear passage of equipment through access openings.
- C. Samples: Submit samples illustrating car interior finishes, car and hoistway door and frame finishes, and handrail material and finish in the form of cut sheets or finish color selection brochures.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Initial Maintenance Contract.
- F. Maintenance Contract: Submit proposal to Owner for standard one year continuing maintenance contract agreement in accordance with ASME A17.1 and requirements as indicated, starting on date initial maintenance contract is scheduled to expire.
 - 1. Indicate in proposal the services, obligations, conditions, and terms for agreement period and for renewal options.
- G. Operation and Maintenance Data:
 - 1. Parts catalog with complete list of equipment replacement parts; identify each entry with equipment description and identifying code.
 - 2. Operation and maintenance manual.
 - 3. Schematic drawings of equipment, and wiring diagrams of installed electrical equipment with list of corresponding symbols to identify markings on machine room and hoistway apparatus.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years of documented experience and approved by elevator manufacturer.
- C. Products Requiring Fire Resistance Rating: Listed and classified by ITS (DIR), UL (DIR), or testing agency acceptable to authorities having jurisdiction.
- D. Products Requiring Electrical Connection: Listed and classified by UL (DIR) or testing agency acceptable to authorities having jurisdiction as suitable for the purpose indicated in construction documents.

1.07 WARRANTY

- A. Provide manufacturer's warranty for elevator operating equipment and devices for one year from Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Electric Traction Elevators:
 - 1. Otis Elevator Company: www.otis.com/#sle.
 - 2. ThyssenKrupp Elevator: www.thyssenkruppelevator.com/#sle.

2.02 ELECTRIC TRACTION ELEVATORS

- A. Electric Traction Passenger Elevator:
 - 1. Electric Traction Elevator Equipment:
 - a. Gearless Traction Machine: Single wrapped traction driving sheave, with dual brake.
 - 2. Drive System:
 - a. Solid-state electronic device with alternating current (AC) with regenerative drive.
 - 3. Operation Control Type:
 - a. Selective Collective Automatic Operation Control.

4. Service Control Types:
 - a. Standard service control.
5. Interior Car Height: 93 inch.
6. Electrical Power: 208 volts; alternating current (AC); three phase; 60 Hz.
7. Rated Net Capacity: 3500 pounds.
8. Rated Speed: 350 feet per minute.
9. Hoistway Size: As indicated on drawings.
10. Interior Car Platform Size: As indicated on drawings.
11. Elevator Pit Depth: 60 inch.
12. Overhead Clearance at Top Floor: 151 inch.
13. Travel Distance: As indicated on drawings.
14. Traction Machine Location: Top of hoistway shaft against wall.

2.03 COMPONENTS

- A. Elevator Equipment:
 1. Motors, Controllers, Controls, Buttons, Wiring, Devices, and Indicators: Comply with NFPA 70 requirements, and see Divisions 26 for additional information.
 2. Guide Rails, Cables, Counterweights, Sheaves, Buffers, Attachment Brackets and Anchors: Design criteria for components includes safety factors in accordance with applicable requirements of Elevator Code, ASME A17.1.
 3. Buffers:
 - a. Spring type for elevators with speed less than or equal to 200 feet per minute.
 4. Lubrication Equipment:
 - a. Provide grease fittings for periodic lubrication of bearings.
 - b. Grease Cups: Automatic feed type.
 - c. Lubrication Points: Visible and easily accessible.
- B. Electrical Equipment:
 1. Motors: NEMA MG 1.
 2. Boxes, Conduit, Wiring, and Devices: Comply with NFPA 70 requirements, and see Division 26 for additional information.
 3. Spare Conductors: Provide ten percent in extra conductors and two pairs of shielded audio cables in traveling cables.
 4. Include wiring and connections to elevator devices remote from hoistway. Provide additional components and wiring to suit machine room layout.

2.04 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1, applicable local codes, and authorities having jurisdiction (AHJ).
- B. Accessibility Requirements: Comply with ADA Standards.
- C. Perform structural steel design, fabrication, and installation in accordance with AISC 360.
- D. Perform welding of steel in accordance with AWS D1.1/D1.1M.
- E. Fabricate and install door and frame assemblies in accordance with NFPA 80 and complying with requirements of authorities having jurisdiction (AHJ).
- F. Perform electrical work in accordance with NFPA 70.
- G. Comply with fire protection sprinkler system of hoistway design in accordance with NFPA 13 requirements and authorities having jurisdiction (AHJ). See Section 211300.

2.05 OPERATION CONTROLS

- A. Owner Requirement: Non-proprietary control systems are required. Manufacturer specific control systems are NOT ALLOWED.
- B. Elevator Controls: Provide landing operating panels and landing indicator panels.

1. Landing Operating Panels: Metallic type, one for originating "Up" and one for originating "Down" calls, one button only at terminating landings; with illuminating indicators.
 2. Landing Indicator Panels: Illuminating.
 3. Comply with ADA Standards for elevator controls.
- C. Interconnect elevator control system with building fire alarm, card access, smoke alarm, and building management control systems.
- D. Door Operation Controls:
1. Program door control to open doors automatically when car arrives at floor landing.
 2. Render "Door Close" button inoperative when car is standing at dispatch landing with doors open.
 3. Door Safety Devices: Moveable, retractable safety edges, quiet in operation; equipped with photo-electric light rays.
- E. Lobby Monitoring Panel:
1. Locate status indicator and control panel for each individual elevator and group of elevators as indicated on drawings.
 2. Etch face plate markings in panel, and fill with paint of contrasting color.
 3. Include direction indicator displaying landing "Up" and "Down" calls registered at each landing floor.
 4. Include position and motion display for direction of travel of each elevator; display appropriate graphic characters on non-glare screen; indicate position of cars at rest and in motion.
 5. Include "Firefighter's Service Switch" that manually recalls each elevator to main floor.
- F. Provide "Firefighter's Emergency Operation" in accordance with ASME A17.1, applicable building codes, and authorities having jurisdiction (AHJ).
1. Designated Landing: Main Lobby.

2.06 OPERATION CONTROL TYPE

- A. Selective Collective Automatic Operation Control: Applies to car in single elevator shaft.
1. Refer to description provided in ASME A17.1.
 2. Automatic operation by means of one button in the car for each landing served and by "UP" and "DOWN" buttons at the landings.
 3. Stops are registered by momentary actuation of landing car buttons without consideration of the number of buttons actuated or the sequence buttons are actuated, but the stops are made in the order that landings are reached in each direction of travel.
 4. All "UP" landing calls are made when car is traveling in the up direction.
 5. All "DOWN" landing calls are made when car is traveling in the down direction.
 6. Uppermost and lowermost calls are answered as soon as they are reached without consideration of the car travel direction.

2.07 EMERGENCY POWER

- A. Set-up elevator operation to run with elevator emergency power supply when the normal building power supply fails, and in compliance with ASME A17.1 requirements.
- B. Elevator Emergency Power Supply: Supplied by battery backup; provide elevator system components as required for emergency power characteristics.
- C. Emergency Lighting: Comply with ASME A17.1 elevator lighting requirements.
- D. Provide operational control circuitry for adapting the change from normal to emergency power.
- E. Upon transfer to emergency power, advance one elevator at a time to a pre-selected landing, stop car, open doors, disable operating circuits, and hold in standby condition.

2.08 MATERIALS

- A. Rolled Steel Sections, Shapes, Rods: ASTM A36/A36M.
- B. Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel), with matte finish.

- C. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- D. Stainless Steel Sheet: ASTM A666, Type 304; No. 4 Brushed finish unless otherwise indicated.
- E. Stainless Steel Bars, Shapes and Moldings: ASTM A276/A276M, Type 304.
- F. Extruded Aluminum: ASTM B221 (ASTM B221M), natural anodized finish unless otherwise indicated.
- G. Tempered Glass: 3/8 inch minimum thickness, fully tempered in compliance with ASME A17.1, 16 CFR 1201, ANSI Z97.1, and ASTM C1048 tempered glass requirements.

2.09 CAR AND HOISTWAY ENTRANCES

- A. Elevator, No. 1:
 - 1. Car and Hoistway Entrances:
 - a. Framed Opening Finish and Material: Brushed stainless steel.
 - b. Car Door Material: Stainless steel, with rigid sandwich panel construction.
 - c. Hoistway Door Material: Stainless steel, with rigid sandwich panel construction.
 - d. Door Type: Double leaf.
 - e. Door Operation: Side opening, two speed.
 - f. Door Width: As indicated on drawings.
 - g. Door Height: As indicated on drawings.
 - h. Sills: Extruded aluminum.
- B. Sills/Thresholds: Configure to align with frame return and coordinate with floor finish.

2.10 CAR EQUIPMENT AND MATERIALS

- A. Elevator Car, No. 1:
 - 1. Car Operating Panel: Provide main and auxiliary; flush-mounted applied face plate, with illuminated call buttons corresponding to floors served with "Door Open/Door Close" buttons, "Door Open" button, "Door Close" button, and alarm button.
 - a. Panel Material: Integral with front return; one per car.
 - b. Car Floor Position Indicator: Above door with illuminating position indicators.
 - c. Locate alarm button where it is unlikely to be accidentally actuated; not more than 54 inch above car finished floor.
 - d. Provide following within service cabinet as part of car operating panel:
 - 1) Switch for each auxiliary operational control, keyed.
 - 2) Switches for fan, light, and inspection control.
 - 3) Emergency light.
 - 4) Telephone cabinet and hard-wired connection with telephone.
 - e. Provide convenience outlet receptacle; 110VAC, 15 amps, locate below service cabinet.
 - 2. Ventilation: Two speed fan with grille above ceiling.
 - 3. Flooring: Resilient vinyl tile.
 - 4. Wall Base: Recessed stainless steel, 4 inch high.
 - 5. Front Return Panel: Match material of car door.
 - 6. Door Wall: Stainless steel.
 - 7. Side Walls: Stainless steel.
 - 8. Rear Wall: Stainless steel.
 - 9. Hand Rail: Aluminum, at three side walls. Provide open clearance space 1-1/2 inch (38 mm) wide to face of wall.
 - a. Flat Bar Stock, Solid: 1/2 inch thick by 2.5 inch high.
 - b. Aluminum Finish: Clear anodized.
 - 10. Ceiling:
 - a. Canopy Ceiling: Stainless steel.
 - b. Lighting: Six LED recessed fixtures.

B. Car Accessories:

1. Certificate Frame: Stainless steel frame glazed with clear tempered glass, and attached with tamper-proof screws.
2. Protective Pads: Canvas cover, padded with impact-resistant fill material, sewn with piping edges; fire resistant in compliance with ASME A17.1; brass grommets for supports, covering side and rear walls and front return, with cut-out for control panel; provide one set for each elevator.
 - a. Color: Tan.
 - b. Provide at least 4 inch clearance from bottom of pad to finished floor.
 - c. Pad Supports: Stainless steel studs, and mounted from ceiling frame.

2.11 FINISHES

- A. Clear Anodized Finish: Class I, AAMA 611 AA-M12C22A41 Clear anodic coating with electrolytically deposited organic seal; not less than 0.7 mils, 0.0007 inch thick.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting this work.
- B. Verify that hoistway and pit are ready for work of this section.
- C. Verify hoistway shaft and openings are of correct size and within tolerance.
- D. Verify location and size of machine foundation and position of machine foundation bolts.
- E. Verify that electrical power is available and of correct characteristics.

3.02 INSTALLATION

- A. Coordinate this work with installation of hoistway wall construction.
- B. Install system components, and connect equipment to building utilities.
- C. Provide conduit, electrical boxes, wiring, and accessories; see Division 26.
- D. Mount machines and motors on vibration and acoustic isolators.
 1. Place on structural supports and bearing plates.
 2. Securely fasten to building supports.
 3. Prevent lateral displacement.
- E. Install hoistway, elevator equipment, and components in accordance with approved shop drawings.
- F. Install guide rails to allow for expansion and contraction movement of guide rails.
- G. Accurately machine and align guide rails, forming smooth joints with machined splice plates.
- H. Bolt brackets to inserts placed in concrete form work.
- I. Install hoistway door sills, frames, and headers in hoistway walls; grout sills in place, set hoistway floor entrances in alignment with car openings, and align plumb with hoistway.
- J. Fill hoistway door frames solid with grout; see Section 042000 for additional information.
- K. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime with two coats.
- L. Wood Surfaces not Exposed to Public View: Finish with one coat primer; one coat enamel.
- M. Adjust equipment for smooth and quiet operation.

3.03 TOLERANCES

- A. Guide Rail Alignment: Plumb and parallel to each other in accordance with ASME A17.1 and ASME A17.2.
- B. Car Movement on Aligned Guide Rails: Smooth movement, without any objectionable lateral or oscillating movement or vibration.

3.04 FIELD QUALITY CONTROL

- A. Operational Tests:
 - 1. Perform operational tests in the presence of Owner and Architect.
 - 2. At an agreed time, and the building occupied with normal building traffic, conduct tests to verify performance.
 - a. Furnish event recording of each landing call registrations, time initiated, and response time throughout entire working day.

3.05 ADJUSTING

- A. Adjust for smooth acceleration and deceleration of car to minimize passenger discomfort.
- B. Adjust with automatic floor leveling feature at each floor landing to reach 1/4 inch maximum from flush with sill.

3.06 CLEANING

- A. Remove protective coverings from finished surfaces.
- B. Clean surfaces and components in accordance with manufacturers written instructions.

3.07 CLOSEOUT ACTIVITIES

- A. Demonstrate proper operation of equipment to Owner's designated representative.
- B. Training: Train Owner's personnel on cleaning and operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.

3.08 PROTECTION

- A. Do not permit construction traffic within car after cleaning.
- B. Protect installed products until Date of Substantial Completion.
- C. Touch-up, repair, or replace damaged products and materials before Date of Substantial Completion.

3.09 MAINTENANCE

- A. Provide Initial Maintenance Contract of elevator system and components in accordance with ASME A17.1 and requirements as indicated for twelve months from Date of Substantial Completion.
- B. Perform maintenance contract services using competent and qualified personnel under the supervision and direct employ of the elevator manufacturer or installer.
- C. Maintenance contract services shall not be assigned or transferred to any agent or other entity without prior written consent of Owner.
- D. Include systematic examination, adjustment, and lubrication of elevator equipment.
- E. Maintain and repair or replace parts, whenever required, using parts produced by original equipment manufacturer.
- F. Perform work without removing cars from use during peak traffic periods.
- G. Provide emergency call back service during regular working hours throughout period of this maintenance contract.

END OF SECTION

**SECTION 149100
FACILITY CHUTES**

PART 2 PRODUCTS

1.01 FACILITY CHUTES

1.02 COMPONENTS

- A. Chute: Factory-fabricated to the greatest extent possible, with continuously welded or lock-seamed joints and smooth, nonsnag interior; no protruding bolts, rivets, or hardware and no sharp edges or corners.
 - 1. Sheet Metal Thickness: 16 gauge, 0.06 inch.
 - 2. Fire Rating: In compliance with local building code requirements.
 - 3. Throat Sections: Provide sloped throat sections for chute intake doors, of same material and construction as chute.
 - 4. Fabricate with support frames at each floor with sound isolator pads and expansion joints in chute between each support point.
 - a. Sound Isolator Pads: Provide manufacturer's standard; 1/4 inch top and bottom waffle design, oil resistant, neoprene with 3/8 inch close grained cork core
- B. Chute Intake Doors: Factory-assembled, UL (DIR) listed and labeled door and frame, with self- or automatic-closing and positive latching; frame designed for chase construction, and flush-mounted.
 - 1. Material: Stainless steel, brushed or satin finish.
 - 2. Fire Rating: In compliance with local building code requirements.
- C. Chute Discharge Doors: Factory-assembled, UL (DIR) listed and labeled door and frame, with self- or automatic-closing and positive latching, upon activation of smoke detector or fusible link; style as required for facility chute configuration indicated.
 - 1. Material: Aluminum-coated steel.
 - 2. Fire Rating: In compliance with local building code requirements.
- D. Chute Access Doors: Provide same construction and fire rating as chute intake doors with locks; provide wherever equipment requiring maintenance is located inside chute, including sprinklers, plumbing, and electrical connections.
- E. Chute Intake and Access Door Locks: Mortise or rim cylinder locks keyed alike; key removable only when door is locked.
- F. Roof Vent: Full diameter, extending at least 48 inches above roof level, with roof deck flange.
 - 1. Material: Manufacturer's standard.
 - 2. Provide counterflashing and clamping ring of nonferrous metal compatible with chute material; see Section 076200.
 - 3. Top Unit: Screened vent.
 - 4. At or above top intake opening.
 - 5. At lowest intake opening.
 - 6. In buildings of more than two stories, at every other floor.
- G. Spray Cleaning Equipment:
 - 1. Flushing Spray Unit: Solenoid controlled 3/4-inch NPS spray head mounted above top intake door; see Section 221005 for water piping connections and Section 260583 for wiring connections.
- H. Electrical Controls: 110 VAC; see Section 260583 for wiring connections.

END OF SECTION

**SECTION 149185
SNOW LINER**

PART 1 - GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 03 45 00 - Precast Architectural Concrete: Chute enclosure.
- B. Section 05 52 13 - Pipe and Tube Railings.
- C. Section 05 50 00 - Metal Fabrications.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's printed data sheets on each component, indicating which options are provided.
- B. Shop Drawings: Provide detailed layout of chute and components, indicating interface with structure, enclosing walls, and utilities; include the following:
 - 1. Size of, type of hopper/funnel enclosure.
 - 2. Location, type, and size of each field connection to structure.
 - 3. Clearly indicate components required but not furnished by chute installer.
 - 4. Clean-out access doors and panels.

PART 2 - PRODUCTS

2.01 SNOW CHUTES

- A. Chute Enclosure Material: Precast Architectural Concrete per Section 03 45 00.
- B. Chute Liner Material: HMW Extruded Polyethylene.
 - 1. Thickness: 1/4 inch.
 - 2. Size: As indicated on drawings to form chute.
 - 3. Finish: Smooth.
 - 4. Color: Natural.

2.02 COMPONENTS

- A. Chute Liner: Factory-fabricated to greatest extent possible. Connecting sections shall sleeve inside the sections below, with no bolts, clips, or other projections inside the chute to snag the flow of material. Pre-position support clips.
- B. Intake Hopper: Same material as chute.
- C. Support Frame: Galvanized steel sections, welded. Bolt frame to structure.
- D. Fasteners: Stainless or galvanized. Approved by liner manufacturer. Space at 18" on center maximum.
- E. Provide all other accessories for a complete installation.
- F. Access Doors and Panels: Galvanized steel frame and door/panel. Provide pulls, lockable hasp, and continuous hinges. Allow for drainage.

PART 3 - EXECUTION

3.01 INTERFACE WITH OTHER WORK

- A. Coordinate installation of snow chute with precast concrete wall panel enclosure.

3.02 INSTALLATION

- A. Install snow chute plumb and without offsets or obstructions that would prevent free fall of snow.
- B. Anchor securely in manner required to withstand impact and weight of snow materials in chute.
- C. Install all access doors and panels as shown on drawings.

END OF SECTION

**SECTION 210500
COMMON WORK RESULTS FOR FIRE SUPPRESSION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Escutcheons.
- B. Pipe sleeves.

1.02 RELATED REQUIREMENTS

- A. Section 099113 - Exterior Painting: Preparation and painting of exterior fire protection piping systems.
- B. Section 099123 - Interior Painting: Preparation and painting of interior fire protection piping systems.
- C. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
- D. Section 210553 - Identification for Fire Suppression Piping and Equipment: Piping identification.
- E. Section 211200 - Fire-Suppression Standpipes: Standpipe design.
- F. Section 211300 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

1.03 REFERENCE STANDARDS

- A. ASME A112.18.1 - Plumbing Supply Fittings 2018, with Errata.
- B. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
- C. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems 2019, with Amendment.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's catalog information. Indicate valve data and ratings.
- C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, and floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
- D. Project Record Documents: Record actual locations of components and tag numbering.
- E. Operation and Maintenance Data: Include installation instructions and spare parts lists.
- F. Extra Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Valve Stem Packings: Two for each type and size of valve.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.

- b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section.
 - 1. Minimum five years experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store valves in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Sprinkler-based System:
 - 1. Comply with NFPA 13.
 - 2. See Section 211300.
- B. Combined Sprinkler, Standpipe, and Hose System:
 - 1. Comply with NFPA 13 and NFPA 14.
 - 2. See Sections 211300 and 211200.
- C. Welding Materials and Procedures: Comply with ASME BPVC-IX.
- D. Provide system pipes, fittings, sleeves, escutcheons, seals, and other related accessories.

2.02 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor.
 - 2. Provide sealant for watertight joint.
- B. Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc-coated or cast-iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- C. Pipe Passing Through Mechanical Room Floors above Basement:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.

2. Connect sleeve with floor plate except in mechanical rooms.

2.03 ESCUTCHEONS

- A. Material:
 1. Metals and Finish: Comply with ASME A112.18.1.
- B. Construction:
 1. One-piece for mounting on chrome-plated tubing or pipe and one-piece or split-pattern type elsewhere.
 2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.
- B. Install standpipe piping, hangers, and supports in accordance with NFPA 14.
- C. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- D. Install piping to conserve building space, to not interfere with use of space and other work.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Pipe Hangers and Supports:
 1. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
 2. Place hangers within 12 inches of each horizontal elbow.
 3. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
 4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.
- I. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc-rich primer to welding.
- J. Structural Considerations:
 1. Do not penetrate building structural members unless indicated.
- K. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
- L. Escutcheons:
 1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
 2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.

- 3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.
- M. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, unions, and couplings for servicing are consistently provided.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

**SECTION 210513
COMMON MOTOR REQUIREMENTS FOR FIRE SUPPRESSION EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.
- C. Single phase electric motors.
- D. Three phase electric motors.

1.02 RELATED REQUIREMENTS

- A. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.
- B. Section 262913 - Enclosed Controllers.

1.03 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015 (Reaffirmed 2020).
- B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators 2017.
- C. NEMA MG 1 - Motors and Generators 2021.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.

- b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Provide five year manufacturer warranty for motors larger than 20 horsepower.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Section 260583 for required electrical characteristics.
- B. Electrical Service:
 - 1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
 - 2. Motors Larger than 1/2 Horsepower: 480 volts, three phase, 60 Hz.
- C. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 104 degrees F environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- E. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.02 APPLICATIONS

2.03 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque.
- B. Starting Current: Up to seven times full load current.
- C. Breakdown Torque: Approximately 200 percent of full load torque.
- D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.04 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.05 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.
- E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
- F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.
- G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.06 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1-1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Comply with NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 262913.
- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- J. Sound Power Levels: To NEMA MG 1.
- K. Part Winding Start Where Indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately 50 percent of full winding locked rotor torque.
- L. Weatherproof Epoxy Sealed Motors: Epoxy seal windings using vacuum and pressure with rotor and starter surfaces protected with epoxy enamel; bearings double shielded with waterproof non-washing grease.
- M. Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112.
- N. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.

- C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

**SECTION 210523
GENERAL-DUTY VALVES FOR WATER-BASED FIRE-SUPPRESSION PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Two-piece ball valves with indicators.
- B. Iron butterfly valves with indicators.
- C. Iron OS&Y gate valves.
- D. Trim and drain valves.

1.02 RELATED REQUIREMENTS

- A. Section 210500 - Common Work Results for Fire Suppression: Pipe and fittings.
- B. Section 210553 - Identification for Fire Suppression Piping and Equipment.
- C. Section 210719 - Fire Suppression Piping Insulation.
- D. Section 211300 - Fire-Suppression Sprinkler Systems.
- E. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 ABBREVIATIONS AND ACRONYMS

- A. EPDM: Ethylene-propylene diene monomer.
- B. PTFE: Polytetrafluoroethylene.

1.04 REFERENCE STANDARDS

- A. AWWA C508 - Swing-Check Valves for Waterworks Service, 2-In. Through 48-In. (50-mm Through 1,200-mm) NPS 2017.
- B. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - 2. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - a. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - b. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require

tracking the home location (city, town or village, not home address) for construction personnel on site.

- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Obtain valves for each valve type from single manufacturer.
 - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.
- B. Installer and Maintenance Contractor Qualifications:

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Protect internal parts against rust and corrosion.
 - 2. Protect threads, flange faces, and weld ends.
 - 3. Set valves open to minimize exposure of functional surfaces.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.
 - 2. Store valves in shipping containers and maintain in place until installation.
 - a. Store valves indoors and maintain at higher than ambient dew point temperature.
 - b. If outdoor storage is unavoidable, store valves off the ground in watertight enclosures.
- C. Use the following precautions for handling:
 - 1. Use sling to handle large valves, rigged to avoid damage to exposed parts.
 - 2. Do not use operating handles or stems as lifting or rigging points.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Comply with NFPA 13 for valves.
- B. Valve Pressure Ratings: Not less than minimum pressure rating indicated or higher as required.
- C. Valve Sizes: Same as upstream piping unless otherwise indicated.
- D. Valve Actuator Types:
 - 1. Handwheel: For other than quarter-turn trim and drain valves.

2.02 TWO-PIECE BALL VALVES WITH INDICATORS

- A. Manufacturers:
 - 1. Apollo.
 - 2. Ferguson.
 - 3. Milwaukee.
 - 4. NIBCO.
 - 5. Red White Valve.
 - 6. Watts.
 - 7. Substitutions: See Section 016000 - Product Requirements.
- B. Description:
 - 1. Minimum Pressure Rating: 175 psig.

2. Body Design: Two piece.
3. Body Material: Forged brass or bronze.
4. Port Size: Full or standard.
5. Seat: PTFE.
6. Stem: Bronze or stainless steel.
7. Ball: Chrome-plated brass.
8. Actuator: Worm gear or traveling nut.
9. End Connections for Valves 1 NPS through 2 NPS: Threaded ends.

2.03 IRON BUTTERFLY VALVES WITH INDICATORS

- A. Manufacturers:
 1. Ferguson Enterprises Inc.
 2. Nibco.
 3. Grinnell.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Minimum Pressure Rating: 175 psig.
- C. Body Material: Cast or ductile iron with nylon, EPDM, epoxy, or polyamide coating.
- D. Seat: EPDM.
- E. Stem: Stainless steel.
- F. Disc: Ductile iron, nickel plated.
- G. Actuator: Worm gear or traveling nut.
- H. Supervisory Switch: Internal or external.
- I. Body Design: Grooved-end connections.

2.04 IRON OS&Y GATE VALVES

- A. Manufacturers:
 1. Ferguson Enterprises Inc.
 2. Kennedy Valve; Ken-Seal Series, AWWA Compliant.
 3. Substitutions: See Section 016000 - Product Requirements.
- B. AWWA C508 compliant gate valves.
- C. Minimum Pressure Rating: 175 psig.
- D. Body and Bonnet Material: Cast or ductile iron.
- E. Wedge: Cast or ductile iron, or bronze with elastomeric coating.
- F. Wedge Seat: Cast or ductile iron, or bronze with elastomeric coating.
- G. Stem: Brass or bronze.
- H. Packing: Non-asbestos PTFE.
- I. Supervisory Switch: External.
- J. End Connections: Flanged.

2.05 TRIM AND DRAIN VALVES

- A. Ball Valves:
 1. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Design: Two piece.
 - c. Body Material: Forged brass or bronze.
 - d. Port Size: Full or standard.
 - e. Seat: PTFE.
 - f. Stem: Bronze or stainless steel.
 - g. Ball: Chrome-plated brass.
 - h. Actuator: Hand-lever.

- i. End Connections for Valves 1 NPS through 2-1/2 NPS: Threaded ends.
- B. Angle Valves:
 - 1. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Material: Brass or bronze.
 - c. Ends: Threaded.
 - d. Stem: Bronze.
 - e. Disc: Bronze.
 - f. Packing: Asbestos free.
 - g. Handwheel: Malleable iron, bronze, or aluminum.
- C. Globe Valves:
 - 1. Description:
 - a. Pressure Rating: 175 psig.
 - b. Body Material: Bronze with integral seat and screw-in bonnet.
 - c. Ends: Threaded.
 - d. Stem: Bronze.
 - e. Disc Holder and Nut: Bronze.
 - f. Disc Seat: Nitrile.
 - g. Packing: Asbestos free.
 - h. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Confirm valve interior to be free of foreign matter and corrosion.
- B. Remove packing materials.
- C. Examine guides and seats by operating valves from the fully open position to the fully closed position.
- D. Examine valve threads and mating pipe for form and cleanliness.
- E. Examine mating flange faces for conditions that might cause leakage.
 - 1. Check bolting for proper size, length, and material.
 - 2. Verify gasket for size, defects, damage, and suitable material composition for service.
 - 3. Replace all defective valves with new valves.

3.02 INSTALLATION

- A. Comply with specific valve installation requirements and application in the following Sections:
 - 1. Section 211300 for application of valves in wet and dry pipe, fire-suppression sprinkler systems.
- B. Install listed fire protection shutoff valves supervised-open, located to control sources of water supply except from fire department connections.
 - 1. Install permanent identification signs indicating portion of system controlled by each valve.
- C. Install check valve in water supply connections and backflow preventer at potable water supply connections.
- D. Valves with threaded connections to have unions at equipment arranged for easy access, service, maintenance, and equipment removal without system shutdown.
- E. Valves in horizontal piping installed with stem at or above the pipe center.
- F. Position valves to allow full stem movement.
- G. Install valve tags. Comply with Section 210553 requirements for valve tags, schedules, and signs on surfaces concealing valves; and the appropriate NFPA standard applying to the piping system in which valves are installed.

END OF SECTION

SECTION 210548
VIBRATION AND SEISMIC CONTROLS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT
PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vibration isolation requirements.
- B. Vibration-isolated equipment support bases.
- C. Vibration isolators.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete.

1.03 DEFINITIONS

- A. Fire Suppression Component: Where referenced in this section in regards to seismic controls, applies to any portion of the fire suppression system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., piping).

1.04 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications Most Recent Edition Cited by Referring Code or Reference Standard.
- C. ICC (IBC) - International Building Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.06 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
 - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.

1.07 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the

Vibration and Seismic Controls for
Fire Suppression Piping and
Equipment

project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.08 QUALITY ASSURANCE

- A. Comply with applicable building code.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

- A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing fire suppression equipment.
- B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:
- C. General Requirements:
 1. Select vibration isolators to provide required static deflection.
 2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
- D. Equipment Isolation:
 1. Equipment Type: Motor Driven Equipment over 40 hp.
 - a. Mounting: Vibration-isolated concrete inertia base.
- E. Piping Isolation:
 1. Use flexible piping connections to vibration-isolated equipment.

2.02 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

- A. Vibration-Isolated Structural Steel Bases:
 1. Description: Engineered structural steel frames with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
- B. Vibration-Isolated Concrete Inertia Bases:
 1. Description: Concrete-filled engineered steel forms with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
 2. Minimum Base Depth: 6 inches.
 3. Minimum Base Mass (Including Concrete): 1.5 times weight of supported equipment.
 4. Concrete Reinforcement: Welded or tied reinforcing bars running both ways in a single layer.

5. Concrete: Filled on site with minimum 3000 psi concrete in accordance with Section 033000.
6. Pump Applications: Size and configure bases for piping elbow supports as required.

2.03 VIBRATION ISOLATORS

- A. General Requirements:
 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
 2. Spring Elements for Spring Isolators:
 - a. Color code or otherwise identify springs to indicate load capacity.
 - b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
 - c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
 - d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
 - e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
 - f. Selected to function without undue stress or overloading.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
- E. Vibration Isolation Systems:
 1. Vibration-Isolated Equipment Support Bases:
 - a. Provide specified minimum clearance beneath base.
 2. Spring Isolators:
 - a. Position equipment at operating height; provide temporary blocking as required.
 - b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
 - c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
 3. Isolator Hangers:
 - a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
 - b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
 4. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
 5. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
 6. Adjust isolators to be free of isolation short circuits during normal operation.
 7. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect vibration isolation and/or seismic control components for damage and defects.
- C. Provide manufacturer representative or authorized technician services to assist with inspection and testing of vibration isolation systems and seismic controls. Submit a detailed copy of manufacturer recommended inspection, testing, and field report procedures.
- D. Vibration Isolation Systems:
 - 1. Verify isolator static deflections.
 - 2. Verify vibration isolation performance during normal operation; investigate sources of isolation short circuits.
- E. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

END OF SECTION

**SECTION 210553
IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Stencil paint.

1.03 REFERENCE STANDARDS

- A. ASTM D709 - Standard Specification for Laminated Thermosetting Materials 2017.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation instructions.
- F. Project Record Documents: Record actual locations of tagged valves.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufactured within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

- A. Automatic Controls: Tags.

- B. Control Panels: Nameplates.
- C. Instrumentation: Tags.
- D. Piping: Tags.
- E. Valves: Nameplates.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brady Corporation.
 - 2. Brimar Industries, Inc.
 - 3. Craftmark Identification Systems.
 - 4. Kolbi Pipe Marker Company.
 - 5. Panduit.
 - 6. Seton Identification Products, a Tricor Direct Company.
 - 7. Substitutions: See Section 016000 - Product Requirements.
- B. Description: Laminated three-layer plastic with engraved letters.
 - 1. Letter Color: Black.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: White.
 - 4. Thickness: 1/8 inch.
 - 5. Plastic: Comply with ASTM D709.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving, LLC.
 - 2. Brady Corporation.
 - 3. Brimar Industries, Inc.
 - 4. Craftmark Pipe Markers.
 - 5. Kolbi Pipe Marker Company.
 - 6. Seton Identification Products, a Tricor Direct Company.
 - 7. Substitutions: See Section 016000 - Product Requirements.
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation.
 - 2. Brimar Industries, Inc.
 - 3. Craftmark Pipe Markers.
 - 4. Kolbi Pipe Marker Company.
 - 5. Panduit.
 - 6. Seton Identification Products, a Tricor Company.
 - 7. Substitutions: See Section 016000 - Product Requirements.
- B. Color: Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

- E. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- F. Color code as follows:
 - 1. Fire Quenching Fluids: Red with white letters.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- E. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- F. Locate ceiling tacks to locate valves above T-bar type panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

**SECTION 211100
FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Water pipe.
- B. Valves.
- C. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 210500 - Common Work Results for Fire Suppression.
- B. Section 211300 - Fire-Suppression Sprinkler Systems.
- C. Section 260583 - Wiring Connections.

1.03 REFERENCE STANDARDS

- A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
- B. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250 2021.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- E. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
- F. ASTM A48/A48M - Standard Specification for Gray Iron Castings 2022.
- G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- H. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings 2004 (Reapproved 2019).
- I. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).
- J. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings 2017.
- K. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.
- L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
- M. ASTM B584 - Standard Specification for Copper Alloy Sand Castings for General Applications 2022.
- N. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- O. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.
- P. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems 2018.
- Q. AWWA C110/A21.10 - Ductile-Iron and Gray-Iron Fittings 2021.
- R. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2017.
- S. AWWA C151/A21.51 - Ductile-Iron Pipe, Centrifugally Cast 2017, with Errata (2018).
- T. AWWA C206 - Field Welding of Steel Water Pipe 2017.
- U. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service 2015.
- V. AWWA C550 - Protective Interior Coatings for Valves and Hydrants 2017.
- W. AWWA C600 - Installation of Ductile-Iron Mains and Their Appurtenances 2017.
- X. AWWA M11 - Steel Pipe - A Guide for Design and Installation 2016, with Addendum (2019).
- Y. CDA A4015 - The Copper Tube Handbook Current Edition.

- Z. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

AA. UL (DIR) - Online Certifications Directory Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.
- C. Product Data:
 - 1. Include data on pipe materials, pipe fittings, valves, and accessories.
 - 2. Provide manufacturer's catalog information.
 - 3. Indicate valve data and ratings.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Project Record Documents:
 - 1. Record actual locations of piping mains, valves, connections, fire hydrants, free-standing fire department connections, valve boxes, thrust restraints, and invert elevations.
- F. Maintenance Data: Include installation instructions, spare parts lists, and exploded assembly views.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements for additional provisions.
 - 2. Valve Repacking Kits: One for each type and size of valve.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least five years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.
- E. Provide grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 WATER PIPE

- A. Steel Pipe and Fittings:
 - 1. Pipe: Standard weight, zinc-coated, listed, ASTM A53/A53M.
 - 2. Fittings: Comply with ASME B16.3 Class 150, zinc-coated, threaded or ASME B16.4 Class 125, zinc-coated.
 - 3. Mechanically Factory Applied Protective Materials:
 - a. Clean by wire brushing and solvent cleaning.
 - b. Apply one coat of coal-tar primer and two coats of coal-tar enamel complying with AWWA C203.
 - c. Protect threaded pipe ends and fittings prior to coating.
- B. Ductile Iron Pipe: Listed, AWWA C151/A21.51.
 - 1. Fittings: AWWA C110/A21.10, ductile iron, standard thickness.
 - 2. Joints: AWWA C111/A21.11, styrene-butadiene rubber (SBR) or vulcanized SBR rubber gasket with 3/4 inch diameter rods.
- C. Copper Tubing: Listed, ASTM B88 (ASTM B88M), Type K (A), annealed.
 - 1. Fittings: ASME B16.18 cast copper or ASME B16.22 wrought copper.
 - 2. Joints: Compression connection or AWS A5.8M/A5.8, BCuP silver braze.

2.02 VALVES

- A. General:
 - 1. Manufacturer's name and pressure rating marked on valve body.
 - 2. Minimum Compliance: UL (DIR) listed and labeled.
 - 3. Maximum Inlet Pressure: 400 psi.
 - 4. Maximum Service Temperature: 180 degrees F.
 - 5. Valve Coatings:
 - a. Internally: 4 mils, 0.004 inch epoxy, minimum.

- b. Externally: Epoxy base then fire red enamel paint or heat-fused red epoxy paint.
- B. Pressure Reducing Valves:
 - 1. Type: Globe valve, self-controlled using external pilot control assembly.
 - 2. Function: Reduce higher inlet pressure to an adjustable, constant lower outlet pressure independent of flow rate fluctuations.
 - 3. Construction:
 - a. Body: ASTM A536, ductile iron Grade 65-45-12.
 - b. Main Valve Seat Ring: ASTM B61, bronze.
 - c. Stem: Stainless steel.
 - d. Elastomer Diaphragms, Resilient Seats, and O-rings: Buna-N.
 - e. Pilot Control System: ASTM B61, bronze with stainless steel trim.
- C. Gravity (Swing) Check Valve, Flanged End:
 - 1. 2-1/2 inch NPS to 10 inch NPS:
 - a. Construction:
 - 1) Body: Cast iron complying with ASTM A126, Class B.
 - 2) Disc: ASTM A126 cast iron, ASTM A536 ductile iron, or ASTM B584 cast brass.
 - 3) Replaceable seats and discs.
 - 4) Maximum Working Pressure: 175 psi.
- D. Gravity (Swing) Check Valve, Grooved End:
 - 1. 2-1/2 inch NPS to 6 inch NPS:
 - a. Construction:
 - 1) Body: ASTM A48/A48M gray iron, ASTM A126 cast iron, or ASTM A536 cast iron.
 - 2) Coatings (as applicable): Rust inhibiting orange enamel paint on exterior and interior surfaces.
 - 3) Clapper:
 - (a) Material: Constructed of stainless steel or ductile iron.
 - (b) Facing: EPDM.
 - 4) Seat: Constructed of stainless steel, brass, or bronze.
 - 5) Spring: Stainless steel.
 - 6) Hinge Pin: Stainless steel.
 - 7) Maximum Working Pressure: 250 psi.
- E. Double Check Detector Valve Assembly, Flanged End:
 - 1. 2-1/2 inch NPS to 10 inch NPS:
 - a. Construction:
 - 1) Body: 300 Series stainless steel or ASTM A536 Grade 65-45-12 ductile iron.
 - 2) Two independently operating, spring-loaded, check valves.
 - 3) Two OSY resilient seated gate valves.
 - 4) Bypass Assembly:
 - (a) Bypass Line: Hydraulically sized to accurately measure low flow.
 - (b) Double check including shut-off valves, and required cocks.
 - 5) Cam-Check:
 - (a) Internally loaded, providing positive, drip-tight closure against reverse flow.
 - (b) Stainless steel cam arm and spring, rubber-faced disc, and replaceable, thermoplastic seat.
 - 6) Valve Cover:
 - (a) Provides access to all internal parts.
 - (b) Held in place through the use of a single grooved style two-bolt coupling.
- F. Reduced-Pressure Zone (RPZ) Device, Flanged End:
 - 1. 2-1/2 inch NPS to 10 inch NPS:
 - a. Construction:
 - 1) Main Valve Body: ASTM A536 Grade 65-45-12 ductile iron, 300 Series stainless steel, or 304 Series stainless steel.

- 2) Relief Valve Body: ASTM A536 Grade 65-45-12 ductile iron, 300 Series stainless steel, or 304 Series stainless steel.
- 3) Coating (As Applicable): Fusion epoxy internal and external, AWWA C550.
- 4) Shutoff Valves: NRS resilient wedge gate valve, AWWA C509.
- 5) Check Seats: Stainless steel.
- 6) Disc Holder: Stainless steel.
- 7) Elastomer Disc: Silicone, PPE/polystyrene, EPDM, or Buna-N.
- 8) Spring: Stainless steel.
- 9) Inlet/Outlet Flow:
 - (a)
 - (b) Inlet:
 - (1) Orientation: Horizontal.
 - (2) Flow Direction: Up.
 - (c) Outlet:
 - (1) Orientation: Vertical.
 - (2) Flow Direction: Horizontal.

2.03 ACCESSORIES

- A. Supervisory Switches: See Section 211300 for waterflow and supervisory switches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

3.02 PREPARATION

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. General Requirements:
 1. Location of Water Lines:
 - a. Terminate the work covered by this Section at a point approximately 5 feet from the building unless indicated otherwise.
 - b. Do not install water line closer horizontally than 10 feet from any sewer line unless indicated otherwise.
 - c. Do not install water lines in the same trench with gas lines, fuel lines, or electric wiring.
 - d. Do not install water piping through or to come into contact with any part of a sewer manhole.
 2. Sleeving:
 - a. Sleeve water piping where piping is required to be installed within 3 feet of existing structures.
 - b. Provide ductile iron or Schedule 40 steel sleeves.
 - c. Fill annular space between pipe and sleeves with mastic.
 - d. Install water pipe and sleeve without damaging structures or causing settlement or movement of foundations or footings.
 3. Pipe Laying and Jointing:
 - a. Remove fins and burrs from pipe and fittings.
 - b. Prior to placing in position, clean pipe, fittings, valves, and accessories, and maintain in clean condition.
 - c. Provide proper facilities for lowering pipe sections into trenches.
 - d. Dropping or dumping of piping, fittings, valves, or any other water line material into trenches is not permitted.

- e. Cut pipe in a neat, workmanlike manner accurately to length established at the site and work into place without forcing or springing.
- f. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material.
- g. Wedging or blocking between bells and spigots will not be permitted.
- h. Install bell-and-spigot pipe with the bell end pointing in the direction of laying.
- i. Grade the pipeline in straight lines avoiding the formation of dips and low points.
- j. Support piping at proper elevation and grade.
- k. Secure firm, uniform support.
- l. Wood support blocking will not be permitted.
- m. Install pipe so that the full length of each pipe section and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings.
- n. Provide anchors and supports where indicated and necessary for fastening work into place.
- o. Provide proper provisions for expansion and contraction of pipelines.
- p. Keep trenches free of water until joints have been properly made.
- q. Close open ends of piping temporarily with wood blocks or bulkheads at the end of each workday.
- r. Do not install pipe during unacceptable trench conditions or inclement weather.
- s. Minimum Depth of Pipe Cover: Not less than 2-1/2 feet.
- 4. Connections to Existing Water Lines:
 - a. Ensure minimal interruption of service on the existing line.
 - b. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped.
- 5. Penetrations:
 - a. Provide ductile-iron or Schedule 40 steel for pipes passing through walls of valve pits and structures.
 - b. Fill annular space between sleeves and walls with rich cement mortar.
 - c. Fill annular space between pipe and sleeves with mastic.
- 6. Flanged Pipe: Install only above grade or with the flanges in valve pits.
- B. Special Requirements:
 - 1. Ductile Iron Piping:
 - a. Unless otherwise specified, install pipe and fittings in accordance with paragraph "General Requirements".
 - b. Jointing:
 - 1) Make push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly.
 - 2) Make mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 for joint assembly and the recommendations of Appendix A to AWWA C111/A21.11.
 - 3) Make flanged joints with the gaskets, bolts, and nuts specified for this type joint.
 - (a) Make flanged joints up tight; avoid undue strain on flanges, fittings, valves, and other accessories and equipment.
 - (b) Align bolt holes for each flanged joint.
 - (c) Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted.
 - (d) Do not allow adjoining flange faces to be out of parallel to such a degree that the flanged joint cannot be made watertight without over-straining the flange.
 - (e) When flanged pipe or fitting has dimensions that do not allow the making of a proper flanged joint as specified, replace it by one of proper dimensions.
 - (f) Use set-screwed flanges to make flanged joints where conditions prevent the use of full length, flanged pipe and assemble in accordance with the

- recommendations of the set-screwed flange manufacturer.
 - 4) Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer.
 - 5) Make grooved and shouldered type joints with the couplings previously specified for this type joint connecting pipe with the grooved or shouldered ends specified for this type joint; assemble in accordance with the recommendations of the coupling manufacturer.
 - (a)
 - (b) Groove pipe in the field only with approved grooved cutting equipment designed especially for the purpose and produced by a manufacturer of grooved joint couplings; secure approval for field-cut grooves before assembling the joint.
 - c. Allowable Deflection:
 - 1) Maximum Allowable Deflection: As stated in AWWA C600.
 - 2) If the alignment requires deflection in excess of the above limitations, furnish special blends or a sufficient number of shorter pipe lengths to provide angular deflections within the limit set forth.
 - d. Pipe Anchorage:
 - 1) Provide concrete thrust blocks (reaction backing), for pipe anchorage except where metal harness is indicated.
 - 2) Thrust blocks to comply with the requirements of AWWA C600 for thrust restraint, except that size and positioning of thrust blocks to be as indicated.
 - 3) Use concrete, ASTM C94/C94M, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2-1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.
 - 4) Provide metal harness in accordance with the requirements of AWWA C600 for thrust restraint, using tie rods and clamps as indicated in NFPA 13, except as otherwise indicated.
 - e. Exterior Protection: Completely encase buried ductile iron pipelines with polyethylene tube or sheet, using Class A polyethylene film, in accordance with AWWA C105/A21.5.
2. Steel Piping:
- a. Jointing:
 - 1) Bell-and-Spigot: Make rubber-gasketed, bell-and-spigot joints with the gaskets previously specified for this type of joint, using an approved lubricant, all in accordance with the pipe manufacturer's recommendations.
 - 2) Welded: Make welded joints in accordance with AWWA C206 and install in accordance with AWWA M11.
 - 3) Sleeve-Type Mechanical Coupling: Assemble sleeve-type mechanical coupling joints in accordance with the coupling manufacturer's recommendations.
 - 4) Flanged:
 - (a) Make flanged joints up tight; avoid undue strain on flanges, fittings, valves, and other equipment and accessories.
 - (b) Align bolt holes for each flanged joint.
 - (c) Use full-size bolts for the bolt holes; use of undersized bolts due to misalignment of bolt holes or for any other purpose will not be allowed.
 - (d) Do not allow adjoining flange faces to be out of parallel to such a degree that the flanged joint cannot be made water-tight without straining the flange.
 - (e) When flanged pipe or fitting has dimensions that do not allow the making of a proper flanged joint as specified, replace it with one of correct dimensions.
 - 5) Grooved:
 - (a) Make grooved type joints with the couplings specified for this type joint connecting pipe with roll-grooved ends or pipe with welded-on cut-grooved

- adapters, each with dimensions as previously specified for this type of joint.
- (b) Groove pipe ends in the field only with approved groove rolling equipment and groove adapters in the field only with approved groove cutting equipment; use only groove rolling and groove cutting equipment designed especially for the purpose and produced by a manufacturer of grooved joint couplings.
- (c) Obtain approval for field-cut grooves prior to assembling the joint.
- 6) Assemble grooved type joints in accordance with the recommendations of the coupling manufacturer.
- b. Allowable Offsets:
 - 1) For pipe with bell-and-spigot rubber-gasket joints, 5 degrees maximum allowable deflections from a straight line or grade, as required by vertical curves, horizontal curves, or offsets; unless a lesser amount is recommended by the manufacturer.
- c. Pipe Anchorage:
 - 1) Provide concrete thrust blocks (reaction backing) for pipe anchorage, except where metal harness is indicated.
 - 2) Thrust blocks to be in accordance with the recommendations for thrust restraint in AWWA M11, except that size and positioning of thrust blocks are to be as indicated.
 - 3) Use ASTM C94/C94M concrete having a minimum compressive strength of 2500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2-1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength.
 - 4) Metal Harness:
 - (a) Provide in accordance with the recommendations for joint harnesses in AWWA M11, except as otherwise indicated.
 - (b) Fabricated by the pipe manufacturer and furnished with the pipe.
- 3. Copper Piping:
 - a. Install in accordance with the Copper Development Association's Copper Tube Handbook and manufacturer's recommendations - CDA A4015.
 - b. Bed piping in 6 inches of sand.
- C. Valves:
 - 1. Set valves on solid bearing.
 - 2. Center and plumb valve box over valve.
 - 3. Set box cover flush with finished grade.

3.04 SERVICE CONNECTIONS

- A. Provide fire water service to Local Authority Having Jurisdiction requirements with reduced pressure backflow preventer and water meter with by-pass valves.
- B. Provide sleeve in retaining wall for service main. Support with reinforced concrete bridge. Caulk enlarged sleeve watertight.
- C. Anchor fire service main to interior surface of foundation wall.
- D. Provide 18 gauge, 0.0478 inch galvanized sheet metal sleeve surrounding service main to 6 inches above floor and 6 feet minimum below grade. Size for 2 inches minimum of glass fiber insulation stuffing.

3.05 FIELD QUALITY CONTROL

- A. Field Tests and Inspections:
 - 1. See Section 014000 - Quality Requirements for additional requirements.
 - 2. Provide all labor, equipment, and incidentals required for field testing, except that water and electric power needed for field tests will be furnished as set forth in Section 015100 - Temporary Utilities.
 - 3. Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently and at least 5 days after placing of concrete after concrete thrust

blocks have hardened sufficiently and at least 5 days after placing of concrete.

4. Fill pipeline 24 hours before testing and apply test pressure to stabilize system, using only potable water.
5. Pressure test piping.
6. If tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost to Owner.
7. Prepare reports of testing activities.

3.06 CLEANING

- A. Upon completion of the installation of water lines and appurtenances, remove and haul away all surplus material, including debris resulting from the work.

3.07 CLOSEOUT ACTIVITIES

- A. Demonstrate proper operation of equipment to Owner's designated representative.
- B. Demonstration: Demonstrate operation of system to Owner's personnel.
 1. Use operation and maintenance data as reference during demonstration.
 2. Conduct walking tour of project.
 3. Briefly describe function, operation, and maintenance of each component.
- C. Training: Train Owner's personnel on operation and maintenance of system.
 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 2. Provide minimum of two hours of training.
 3. Instructor: Manufacturer's training personnel.
 4. Location: At project site.

END OF SECTION

**SECTION 211200
FIRE-SUPPRESSION STANDPIPES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Valves.
- B. Fire department connections.

1.02 RELATED REQUIREMENTS

- A. Section 013000 - Administrative Requirements: Submittal procedures, project meetings, progress schedules and documentation, reports, coordination.
- B. Section 014100 - Regulatory Requirements.
- C. Section 016000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.
- D. Section 017800 - Closeout Submittals: Project record documents, operation and maintenance (O&M) data, warranties and bonds.
- E. Section 210500 - Common Work Results for Fire Suppression: Fire protection piping.
- F. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
- G. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. NFPA 14 - Standard for the Installation of Standpipe and Hose Systems 2019, with Amendment.
- B. UL 405 - Standard for Safety Fire Department Connection Devices Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's catalog sheet for equipment indicating rough-in size, finish, and accessories.
- C. Shop Drawings: Indicate supports, components, accessories, and sizes.
- D. Project Record Documents: Record actual locations of components.
- E. Maintenance Data: Include servicing requirements and test schedule.
- F. Certificates: Provide certificate of compliance from authority having jurisdiction indicating approval of field acceptance tests.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements for additional provisions.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.

- b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Perform Work in accordance with NFPA 14. Maintain one copy on site.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience and approved by manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in shipping packaging until installation.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 VALVES

- A. General Duty Valves: Refer to Section 210523.
- B. Specialty Valves:
 - 1. Hose Station Valve: Angle type, chrome plated finish, 1-1/2 inch nominal size with automatic ball drip.
 - 2. Hose Connection Valve: Angle type; chrome plated finish; 2-1/2 inch size, thread to match fire department hardware, 300 psi working pressure, with threaded cap and chain of same material and finish.
 - 3. Pressure Reducing Valve: Angle type; chrome plated finish with inner hydraulic controls; 1-1/2 inch size, thread to match fire department hardware, 400 psi inlet pressure, with threaded cap and chain of same material and finish.

2.02 FIRE DEPARTMENT CONNECTIONS

- A. Type: Exposed, projected wall mount made of corrosion resistant metal complying with UL 405.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 14.
- C. Connect standpipe system to water source ahead of domestic water connection.
- D. Where static pressure exceeds 100 psi at any hose station, provide pressure reducing valve to prevent pressure on hose exceeding 90 psi.
- E. Provide two way fire department outlet connection on roof.
- F. Flush entire system of foreign matter.

3.02 FIELD QUALITY CONTROL

- A. Perform field inspection and testing (Field Acceptance Test) in accordance with Section 014000.
- B. Test entire system in accordance with NFPA 14.
- C. Test shall be witnessed by Fire Marshal.

END OF SECTION

**SECTION 211300
FIRE-SUPPRESSION SPRINKLER SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wet-pipe sprinkler system.
- B. System design, installation, and certification.
- C. Fire department connections.

1.02 RELATED REQUIREMENTS

- A. Section 210500 - Common Work Results for Fire Suppression: Pipe and fittings.
- B. Section 210523 - General-Duty Valves for Water-Based Fire-Suppression Piping.
- C. Section 210553 - Identification for Fire Suppression Piping and Equipment.
- D. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ITS (DIR) - Directory of Listed Products Current Edition.
- B. NFPA 1963 - Standard for Fire Hose Connections 2019.
- C. UL (DIR) - Online Certifications Directory Current Edition.
- D. UL 405 - Standard for Safety Fire Department Connection Devices Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene two week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Shop Drawings:
 - 1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.
 - 2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components, and accessories. Indicate system controls.
 - 3. Submit shop drawings, product data, and hydraulic calculations to Authorities Having Jurisdiction for approval. Submit proof of approval to Architect.
- D. Manufacturer's Certificate: Certify that system has been tested and meets or exceeds code requirements.
- E. Operation and Maintenance Data: Include components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements for additional provisions.
 - 2. Extra Sprinklers: Type and size matching those installed in quantity required by referenced NFPA design and installation standard.
 - 3. Sprinkler Wrenches: Provide suitable wrenches for each sprinkler type.
- G. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.
 - 1. Sprinklers shall be referred to on drawings, submittals, and other documentation, by the sprinkler identification or Model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be

allowed.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Maintain two copie of referenced design and installation standard on site.
- B. Comply with NFPA 13 requirements.
- C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- D. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years experience.
- E. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.
- F. Equipment and Components: Provide products that bear UL (DIR) label or marking.
- G. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.
 - 1. All castings used for couplings housings, fittings, or valve and specialty bodies shall be date stamped for quality assurance and traceability.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Sprinklers, Valves, and Equipment:
 - 1. Victaulic Company.
 - 2. Tyco Fire Protection Products.
 - 3. Reliable Automatic Sprinkler Company.

4. Viking Corporation.
5. Substitutions: See Section 016000 - Product Requirements.

2.02 SPRINKLER SYSTEM

- A. Sprinkler System: Provide coverage for entire building.
- B. Occupancy: Light Hazard and Ordinary Hazard, Group 1. Comply with NFPA 13 occupancy requirements..
- C. Water Supply: Determine volume and pressure from water flow test data.
 1. Revise design when test data available prior to submittals.
- D. Interface system with building fire and smoke alarm system.
- E. Provide fire department connections where indicated.
- F. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

2.03 SPRINKLERS

- A. Suspended Ceiling Type: Concealed pendant type with matching screw on cover plate.
 1. Response Type: Quick.
 2. Coverage Type: Extended.
 3. Finish: Chrome plated.
 4. Escutcheon Plate Finish: Chrome plated.
 5. Fusible Link: Glass bulb type temperature rated for specific area hazard.
 6. Coupling sprinkler heads may be used in direct substitution where applicable.
- B. Exposed Area Type: Upright type.
 1. Response Type: Quick.
 2. Coverage Type: Extended.
 3. Finish: Brass.
 4. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- C. Sidewall Type: Semi-recessed horizontal sidewall type with matching screw on escutcheon plate.
 1. Response Type: Quick.
 2. Coverage Type: Extended.
 3. Finish: Chrome plated.
 4. Escutcheon Plate Finish: Chrome plated.
 5. Fusible Link: Glass bulb type temperature rated for specific area hazard.
- D. Storage Sprinklers: Pendant type with guard.
 1. Response Type: Standard.
 2. Coverage Type: Standard.
 3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
- E. Escutcheons and Guards shall be listed, supplied, and approved for use with the sprinkler by the sprinkler manufacturer.
- F. Wrenches shall be provided by the sprinkler manufacturer that directly engage the wrench boss cast in the sprinkler body.
- G. Flexible Drop System: Stainless steel, multiple use, open gate type.
 1. Application: Use to properly locate sprinkler heads.
 2. Include all supports and bracing.
 3. Provide braided type 304 stainless steel tube, zinc plated steel male threaded nipple or groove style coupling for connection to branch-line piping, and a zinc plated steel reducer with a female thread for connection to the sprinkler head.
 - a. UL approved with a bend radius to 3".
 4. Manufacturers:
 - a. Anvil International.
 - b. Victaulic Companycom/#sle.
 - c. ARGCO.

- d. Gateway Tubing.
- e. Substitutions: See Section 016000 - Product Requirements.
- 5. In lieu of rigid pipe offsets or return bends for sprinkler drops in wet, dry, and preaction systems in cold storage applications, the Victaulic VicFlex™ V33, V36, or V40 Dry Sprinkler with Integral AB6 Assembly may be used.

2.04 PIPING SPECIALTIES

- A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber-faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
- B. Water Motor Alarm: Hydraulically operated impeller type alarm with aluminum alloy red enameled gong and motor housing, nylon bearings, and inlet strainer.
- C. Electric Alarm: Electrically operated red enameled gong with pressure alarm switch.
- D. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.
- E. Fire Department Connections:
 - 1. Type: Flush, wall mount made of corrosion resistant metal complying with UL 405.
 - a. Inlets: Two way, 2-1/2 inch swivel fittings, internal threaded. Thread size and inlets according to NFPA 1963 or Authority Having Jurisdiction. Brass caps with gaskets, chains, and lugs.
 - b. Configuration: Horizontal.
 - c. Outlet: With pipe threads, 4 NPS.
 - 1) Location: Back.
 - d. Rated Working Pressure: 175 psi.
 - e. Finish: Chrome.
 - f. Signage: Raised or engraved lettering 1 inch minimum indicating system type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with referenced NFPA design and installation standard.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Locate outside alarm gong on building wall.
- D. Place pipe runs to minimize obstruction to other work.
- E. Place piping in concealed spaces above finished ceilings.
- F. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.
- G. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.
- H. Flush entire piping system of foreign matter.
- I. Hydrostatically test entire system.
- J. Require test be witnessed by Authority Having Jurisdiction.

3.02 INTERFACE WITH OTHER PRODUCTS

- A. Ensure required devices are installed and connected as required to fire alarm system.

END OF SECTION

SECTION 213000 FIRE PUMPS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electric jockey pump.
- B. System maintenance.

1.02 RELATED REQUIREMENTS

- A. Section 210513 - Common Motor Requirements for Fire Suppression Equipment.
- B. Section 210548 - Vibration and Seismic Controls for Fire Suppression Piping and Equipment.
- C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- B. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NFPA 20 - Standard for the Installation of Stationary Pumps for Fire Protection 2022, with Amendment (2021).
- D. UL (DIR) - Online Certifications Directory Current Edition.
- E. UL 448 - Centrifugal Stationary Pumps for Fire-Protection Service Current Edition, Including All Revisions.
- F. UL 778 - Standard for Motor-Operated Water Pumps Current Edition, Including All Revisions.
- G. UL 1478 - Fire Pump Relief Valves Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers literature including general assembly, pump curves showing performance characteristics with pump and system, operating point indicated, NPSH curve, controls, wiring diagrams, and service connections.
- C. Shop Drawings: Indicate layout, general assembly, components, dimensions, weights, clearances, and methods of assembly.
- D. Certificates: Certify that fire pumps meet or exceed specified requirements at specified operating conditions and that the installation complies with regulatory requirements. Submit summary and results of shop tests performed in accordance with NFPA 20
- E. Operation Data: Include manufacturers instructions, start-up data, trouble-shooting check lists, for pumps, drivers, and controllers.
- F. Maintenance Data: Include manufacturers literature, cleaning procedures, replacement parts lists, and repair data for pumps, drivers and controllers.
- G. Project Record Documents: Record actual locations of components and accessories.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Pump Gaskets/Screens/Seals: One set for each different pump model.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements.

Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1. Project Goals

- a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
- b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.

B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.

C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

D. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.
- b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Comply with NFPA 13 and NFPA 20; where requirements differ comply with the most stringent.
- B. Maintain on site at all times one copy of each design and installation standard referenced.
- C. Design fire pump system under direct supervision of a Professional Engineer experienced in design of this work and licensed at the State in which the Project is located.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- E. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- F. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience and approved by the manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fire pumps and components in factory packing. Comply with manufacturer's rigging and installation instructions.
- B. Protect fire pumps and components from physical damage including effects of weather, water, and construction debris.
- C. Provide temporary inlet and outlet caps, and maintain in place until installation.

PART 2 PRODUCTS

2.01 FIRE PUMPS

- A. Manufacturers:
 1. AC Fire Pump, a xylem brand.
 2. Patterson Pump Company, a Gorman-Rupp Company.
 3. Peerless Pump Company.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Horizontal base-mounted type; UL 448; and UL 778 horizontal shaft, single-stage, double suction, direct connected, horizontally split casing, for 250 psi maximum working pressure.
 1. Casing: Cast iron, with suction and discharge gauge ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
 2. Impeller: Bronze double suction fully enclosed, balanced and keyed to shaft.
 3. Bearings: Grease lubricated ball bearings, replaceable without opening casing.

4. Shaft: Alloy steel with replaceable bronze shaft sleeve.
 5. Seal: Packing gland with minimum four rings graphite impregnated packing and bronze lantern rings, 230 degrees F maximum continuous operating temperature.
 6. Drive: Flexible coupling with coupling guard.
 7. Baseplate: Cast iron or fabricated steel with integral drain rim.
- C. Accessories:
1. Eccentric suction reducer and OS&Y gate or butterfly valve on suction side of pump.
 2. Concentric increaser and check valve in pump discharge and OS&Y gate or butterfly valve on system side of check valve.
 3. Fire pump bypass fitted with OS&Y gate or butterfly valves and check valve.
 4. Main relief valve, UL 1478 and enclosed type waste cone.
 5. Suction pressure gauge, 4-1/2 inch diameter dial with snubber, valve cock and lever handle.
 6. Discharge pressure gauge mounted on board attached to pump, with snubber, valve cock and lever handle.
 7. 3/4 inch casing relief valve.
 8. Float operated 3/4 inch automatic air release valve.
 9. Hose valve manifold with 2-1/2 inch hose gate valves with caps and chains.
 10. Flow metering system for closed loop testing.

2.02 ELECTRIC MOTOR DRIVE:

- A. Motor: Squirrel cage induction type, NEMA MG 1; in open drip proof NEMA 250 enclosure, 3500 rpm. Refer to Section 210513.
- B. Controller: Limited service type with auto-transformer starter, in NEMA 250 enclosure, including the following:
1. Disconnect Switch: Externally operable, quick break type.
 2. Circuit Breaker: Comply with NFPA 20; minimum 65,000 amperes interrupting capacity.
 3. Motor Starter: Energized automatically through pressure switch or manually by externally operable handle.
 4. Pressure Switch: Set to cut in at 5 psi less than the jockey pump start point.
 5. Running Period Timer: Keeps motor in operation when started automatically, for a minimum of seven minutes.
 6. Pilot Lamp: Indicates circuit breaker closed and power available.
 7. Test Accessories: Ammeter test link and voltmeter test studs.
 8. Alarm Relay: Energizes alarm to indicate circuit breaker open or power failure.
 9. Switch Relay: For remote start.
 10. Manual Selector Station: On enclosure marked "Automatic" and "Non-Automatic".

2.03 PRESSURE BOOSTER (JOCKEY) PUMP

- A. Electrically operated, horizontal close-coupled type with standard open drip-proof horizontal motor.
- B. Control by automatic jockey pump controller with full voltage starter and minimum run timer to start pump on pressure drop in system and stay in operation for minimum period of time. Fire pump shall start automatically on further pressure drop or on jockey pump failure.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with NFPA 20.
- B. Provide access space around pumps for service; no less than minimum as recommended by manufacturer.
- C. Install piping in accordance with Section 210500. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For base mounted pumps, provide supports under elbows on pump suction and discharge.

- D. Provide drains for bases and seals, piped to and discharging into floor drains.
- E. Mount unit on vibration isolators. Refer to Section 210548.
- F. Provide for connection to electrical service. Refer to Section 260583.
- G. Lubricate pumps before start-up.
- H. Check, align, and certify pumps by qualified installer prior to start-up.

3.02 FIELD QUALITY CONTROL

- A. Perform field inspection and testing in accordance with Section 014000 - Quality Requirements.
- B. Perform hydrostatic tests, flushing, and field acceptance tests as specified in NFPA 20.
- C. Perform field acceptance tests in the presence of Authority Having Jurisdiction.

3.03 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstration:
- D. Demonstrate automatic operation of system including verification of pressure switch set points to Owner.
- E. Use operation and maintenance data as reference during demonstration.
- F. Briefly describe function, operation, and maintenance of each component.
- G. Training: Train Owner's personnel on operation and maintenance of system.
 - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
 - 2. Provide minimum of two hours of training.
 - 3. Location: At project site.

3.04 MAINTENANCE

- A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide service and maintenance of equipment installed under this section for one year from the Date of Substantial Completion.

END OF SECTION

**SECTION 220513
COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.
- C. Single phase electric motors.

1.02 RELATED REQUIREMENTS

- A. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. NEMA MG 1 - Motors and Generators 2021.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- D. Operation Data: Include instructions for safe operating procedures.
- E. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Comply with NFPA 70.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Provide five year manufacturer warranty for motors larger than 20 horsepower.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service: Refer to Section 260583 for required electrical characteristics.
- B. Electrical Service:
 - 1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
- C. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 104 degrees F environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- E. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.02 APPLICATIONS

2.03 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque.
- B. Starting Current: Up to seven times full load current.
- C. Breakdown Torque: Approximately 200 percent of full load torque.
- D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.04 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.05 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque.

- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.
- E. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.
- F. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

**SECTION 220516
EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flexible pipe connectors.
- B. Expansion joints and compensators.

1.02 RELATED REQUIREMENTS

- A. Section 221005 - Plumbing Piping.

1.03 REFERENCE STANDARDS

- A. EJMA (STDS) - EJMA Standards Tenth Edition.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Design Data: Indicate selection calculations.
- C. Project Record Documents: Record installed locations of flexible pipe connectors, expansion joints, anchors, and guides.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Inner Hose: Carbon steel.
- C. Exterior Sleeve: Single braided, stainless steel.

- D. Pressure Rating: 125 psi and 450 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.

2.02 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Inner Hose: Bronze.
- C. Exterior Sleeve: Braided bronze.
- D. Pressure Rating: 125 psi and 450 degrees F.
- E. Joint: Flanged.
- F. Size: Use pipe sized units.
- G. Maximum offset: 3/4 inch on each side of installed center line.
- H. Application: Copper piping.

2.03 EXPANSION JOINTS - STAINLESS STEEL BELLOWS TYPE

- A. Manufacturers:
 - 1. Flex-Weld, Inc: www.kelcoind.com/#sle.
 - 2. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 3. The Metraflex Company: www.metraflex.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Maximum Compression: 1-3/4 inches.
- C. Maximum Extension: 1/4 inch.
- D. Joint: Flanged.
- E. Size: Use pipe sized units.
- F. Application: Steel piping 4 inches and under.

2.04 EXPANSION JOINTS - EXTERNAL RING CONTROLLED STAINLESS STEEL BELLOWS TYPE

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Pressure Rating: 125 psi and 400 degrees F.
- C. Maximum Compression: 15/16 inch.
- D. Maximum Extension: 5/16 inch.
- E. Maximum Offset: 1/8 inch.
- F. Joint: Flanged.
- G. Size: Use pipe sized units.
- H. Application: Steel piping over 2 inches.

2.05 EXPANSION JOINTS - SINGLE SPHERE, ELBOW COMPENSATOR

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.

- B. Pressure Rating, Sizes 3/4 Inch to 2 Inch: 150 psi and 210 degrees F.
- C. Pressure Rating, Sizes 1-1/2 Inch to 12 Inch: 150 psi and 250 degrees F.
- D. Pressure Rating, Sizes 14 Inch to 24 Inch: 105 psi and 250 degrees F.
- E. Maximum Compression: 1/2 inch.
- F. Maximum Elongation: 3/8 inch.
- G. Maximum Offset: 3/8 inch.
- H. Maximum Angular Movement: 15 degrees.
- I. Joint: Tapped steel flanges.
- J. Size: Use pipe sized units.
- K. Accessories: Control rods.
- L. Application: Steel piping 2 inches and over.

2.06 EXPANSION JOINTS - TWO-PLY BRONZE BELLOWS TYPE

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
- B. Construction: Bronze with anti-torque device, limit stops, internal guides.
- C. Pressure Rating: 125 psi and 400 degrees F.
- D. Maximum Compression: 1-3/4 inches.
- E. Joint: Soldered.
- F. Size: Use pipe sized units.
- G. Application: Copper piping.

2.07 EXPANSION JOINTS - LOW PRESSURE COMPENSATOR WITH TWO-PLY BRONZE BELLOWS

- A. Manufacturers:
 - 1. Mercer Rubber Company: www.mercer-rubber.com/#sle.
 - 2. The Metraflex Company: www.metraflex.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Working Pressure: 75 psi.
- C. Maximum Temperatures: 250 degrees F.
- D. Maximum Compression: 1/2 inch.
- E. Maximum Extension: 5/32 inch.
- F. Joint: Flanged.
- G. Size: Use pipe sized units.
- H. Application: Copper or steel piping 3 inches and under.

2.08 EXPANSION JOINTS - HOSE AND BRAID

- A. Manufacturers:
 - 1. The Metraflex Company; Metraloop: www.metraflex.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Provide flexible loops with two flexible sections of hose and braid, two 90 degree elbows, and 180 degree return with support bracket and air release or drain plug.
- C. Provide flexible loops capable of movement in the x, y, and z planes. Flexible loops to impart no thrust loads to the building structure.
- D. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.

1. Maximum Allowable Working Pressure: 150 psig at 120 degrees F.
2. Accommodate the Following:
 - a. Axial Deflection in Compression and Expansion: 0.75 inch.
 - b. Lateral Movement: 0.75 inch.
 - c. Angular Rotation: 15 degrees.
 - d. Force developed by 1.5 times specified maximum allowable operating pressure.
3. End Connections: Same as specified for pipe jointing.
4. Provide necessary accessories including, but not limited to, swivel joints.

2.09 EXPANSION JOINTS - EXTERNALLY PRESSURIZED EXPANSION JOINTS

- A. Manufacturers:
 1. Flex-Weld, Inc; Keflex Externally-Pressurized Expansion Joints: www.kelcoind.com/#sle.
 2. The Metraflex Company; Metragator: www.metralflex.com/#sle.
 3. Substitutions: See Section 016000 - Product Requirements.
- B. Construction: Stainless steel with anti-torque device, limit stops, internal guides.
- C. Maximum Allowable Working Pressure: 150 psig at 700 degrees F.
- D. Maximum Axial Compression: 4 inches.
- E. End Connections: Flanged by weld end.
- F. Size: Use pipe sized units.
- G. Application: Steel piping 2 inches and over.

2.10 ACCESSORIES

- A. Pipe Alignment Guides:
 1. Manufacturers:
 - a. Flex-Weld, Inc: www.kelcoind.com/#sle.
 - b. The Metraflex Company; PGQ Glide Riser Guide: www.metralflex.com/#sle.
 - c. Substitutions: See Section 016000 - Product Requirements.
 2. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.
- B. Swivel Joints:
 1. Fabricated steel body, double ball bearing race, field lubricated, with rubber (Buna-N) o-ring seals.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with EJMA (Expansion Joint Manufacturers Association) Standards.
- C. Install flexible pipe connectors on pipes connected to vibration isolated equipment. Provide line size flexible connectors.
- D. Install flexible connectors at right angles to displacement. Install one end immediately adjacent to isolated equipment and anchor other end. Install in horizontal plane unless indicated otherwise.
- E. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.
- F. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.
- G. Substitute grooved piping for vibration isolated equipment instead of flexible connectors. Grooved piping need not be anchored.

END OF SECTION

**SECTION 220517
SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.

1.03 REFERENCE STANDARDS

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022a.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified this section.
 - 1. Minimum three years experience.
 - 2. Approved by manufacturer.
- C. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Manufacturers:
 - 1. Flexicraft Industries; Pipe Wall Sleeve.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor.
 - 2. Provide sealant for watertight joint.
- C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- D. Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- E. Pipe Passing Through Mechanical Rooms with Level Below:
 - 1. Galvanized steel pipe or black iron pipe with asphalt coating.
 - 2. Connect sleeve with floor plate except in mechanical rooms.
- F. Clearances:
 - 1. Provide allowance for insulated piping.

2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
3. All Rated Openings: Caulked tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Manufacturers:
 1. Advance Products & Systems, LLC; Innerlynx: www.apsonline.com/#sle.
 2. Flexicraft Industries; PipeSeal.
 3. Substitutions: See Section 016000 - Product Requirements.
- B. Modular/Mechanical Seal:
 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
 2. Provide watertight seal between pipe and wall/casing opening.
 3. Elastomer element size and material in accordance with manufacturer's recommendations.
 4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Structural Considerations:
 1. Do not penetrate building structural members unless indicated.
- E. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
 2. Aboveground Piping:
 - a. Pack solid using mineral fiber complying with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
 3. All Rated Openings: Caulk tight with fire stopping material complying with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
- F. Manufactured Sleeve-Seal Systems:
 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 3. Locate piping in center of sleeve or penetration.
 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 5. Tighten bolting for a water-tight seal.
 6. Install in accordance with manufacturer's recommendations.
- G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

**SECTION 220519
METERS AND GAUGES FOR PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pressure gauges and pressure gauge taps.
- B. Thermometers and thermometer wells.
- C. Static pressure gauges.

1.02 RELATED REQUIREMENTS

- A. Section 22 05 23 - General Duty Valves for Plumbing Piping.
- B. Section 22 10 05 - Plumbing Piping.
- C. Section 22 30 00 - Plumbing Equipment.

1.03 REFERENCE STANDARDS

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments 2022.
- B. ASME MFC-3M - Measurement of Fluid Flow in Pipes Using Orifice, Nozzle, and Venturi 2004 (Reaffirmed 2017).
- C. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers 2014 (Reapproved 2020).
- D. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers 2014 (Reapproved 2021).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Project Record Documents: Record actual locations of components and instrumentation.

1.05

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
 - d. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 FIELD CONDITIONS

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

- A. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
 - 1. Case: Steel with brass bourdon tube.
 - 2. Size: 4-1/2 inch diameter.
 - 3. Mid-Scale Accuracy: One percent.

2.02 PRESSURE GAUGE TAPPINGS

- A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.
- B. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psi.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.
- D. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.

2.03 STEM TYPE THERMOMETERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc.
 - 2. Omega Engineering, Inc.
 - 3. Weksler Glass Thermometer Corp.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Thermometers - Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Accuracy: 2 percent, per ASTM E77.
- C. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
 - 1. Size: 9 inch scale.
 - 2. Window: Clear Lexan.
 - 3. Stem: 3/4 inch NPT brass.
 - 4. Accuracy: 2 percent, per ASTM E77.
 - 5. Calibration: Degrees F.

2.04 DIAL THERMOMETERS

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc.
 - 2. Omega Engineering, Inc.
 - 3. Weksler Glass Thermometer Corp.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Thermometers - Fixed Mounting: Dial type bimetallic actuated; ASTM E1; stainless steel case, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
 - 1. Size: 5 inch diameter dial.
 - 2. Lens: Clear glass.
 - 3. Accuracy: 1 percent.

- C. Thermometers - Adjustable Angle: Dial type bimetallic actuated; ASTM E1; stainless steel case, adjustable angle with front recalibration, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
 - 1. Lens: Clear glass.
 - 2. Accuracy: 1 percent.
- D. Thermometers: Dial type vapor or liquid actuated; ASTM E1; stainless steel case, with brass or copper bulb, copper or bronze braided capillary, white with black markings and black pointer, glass lens.
 - 1. Size: 4-1/2 inch diameter dial.
 - 2. Lens: Clear glass.
 - 3. Length of Capillary: Minimum 5 feet.
 - 4. Accuracy: 2 percent.

2.05 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.
- B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.06 TEST PLUGS

- A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

2.07 STATIC PRESSURE GAUGES

- A. Manufacturers:
 - 1. Dwyer Instruments, Inc.
 - 2. Omega Engineering, Inc.
 - 3. Weksler Glass Thermometer Corp.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install positive displacement meters with isolating valves on inlet and outlet to AWWA M6. Provide full line size valved bypass with globe valve for liquid service meters.
- C. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge.
- D. Install pressure gauges with pulsation dampers. Provide gauge cock to isolate each gauge. Extend nipples and siphons to allow clearance from insulation. Provide siphon on gauges in steam systems.
- E. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- F. Coil and conceal excess capillary on remote element instruments.
- G. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- H. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- I. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.

- J. Locate test plugs adjacent thermometers and thermometer sockets.

END OF SECTION

**SECTION 220523
GENERAL-DUTY VALVES FOR PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Applications.
- B. Angle valves.
- C. Ball valves.
- D. Check valves.
- E. Gate valves.
- F. Globe valves.

1.02 RELATED REQUIREMENTS

- A. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- B. Section 220553 - Identification for Plumbing Piping and Equipment.
- C. Section 221005 - Plumbing Piping.

1.03 ABBREVIATIONS AND ACRONYMS

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Non-rising stem.
- E. OS&Y: Outside screw and yoke.
- F. PTFE: Polytetrafluoroethylene.
- G. RS: Rising stem.
- H. SWP: Steam working pressure.
- I. TFE: Tetrafluoroethylene.
- J. WOG: Water, oil, and gas.

1.04 REFERENCE STANDARDS

- A. ASME B1.20.1 - Pipe Threads, General Purpose, Inch 2013 (Reaffirmed 2018).
- B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.
- C. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.
- D. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves 2022.
- E. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
- F. ASME B16.34 - Valves — Flanged, Threaded, and Welding End 2020.
- G. ASME B31.9 - Building Services Piping 2020.
- H. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings 2017.
- I. AWWA C606 - Grooved and Shouldered Joints 2022.
- J. MSS SP-45 - Drain and Bypass Connections 2020.
- K. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends 2011.
- L. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves 2019.
- M. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends 2011.
- N. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .

- O. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- P. NSF 372 - Drinking Water System Components - Lead Content 2022.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Manufacturer:
 - 1. Obtain valves for each valve type from single manufacturer.
 - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Prepare valves for shipping as follows:
 - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
 - 2. Protect valve parts exposed to piped medium against rust and corrosion.
 - 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
 - 4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
 - 5. Secure check valves in either the closed position or open position.
- B. Use the following precautions during storage:
 - 1. Maintain valve end protection and protect flanges and specialties from dirt.
 - a. Provide temporary inlet and outlet caps.
 - b. Maintain caps in place until installation.
 - 2. Store valves in shipping containers and maintain in place until installation.

- a. Store valves off the ground in watertight enclosures when indoor storage is not an option.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. See drawings for specific valve locations.
- B. Provide the following valves for the applications if not indicated on drawings:
 1. Shutoff: Ball, butterfly, gate or plug.
 2. Dead-End: Single-flange butterfly (lug) type.
 3. Throttling: Provide globe, angle, ball, or butterfly.
 4. Swing Check (Pump Outlet):
 - a. 2 NPS and Smaller: Bronze swing check valves with bronze or nonmetallic disc.
 - b. 2-1/2 NPS and Larger for Domestic Water: Iron swing check valves with closure control, metal or resilient seat check valves.
- C. Substitutions of valves with higher CWP classes or SWP ratings for same valve types are permitted when specified CWP ratings or SWP classes are not available.
- D. Required Valve End Connections for Non-Wafer Types:
 1. Steel Pipe:
 - a. 2 NPS and Smaller: Threaded ends.
 - b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - c. 5 NPS and Larger: Grooved or flanged ends.
 2. Copper Tube:
 - a. 2 NPS and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - b. 2-1/2 NPS to 4 NPS: Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.
- E. Domestic, Hot and Cold Water Valves:
 1. 2 NPS and Smaller:
 - a. Bronze and Brass: Provide with solder-joint ends.
 - b. Bronze Angle: Class 125, bronze disc.
 - c. Ball: One piece, full port, brass with brass trim.
 - d. Bronze Swing Check: Class 125, bronze disc.
 - e. Bronze Gate: Class 125, NRS.
 - f. Bronze Globe: Class 125, bronze disc.
 2. 2-1/2 NPS and Larger:
 - a. Iron, 2-1/2 NPS to 4 NPS: Provide with threaded ends.
 - b. Iron Ball: Class 150.
 - c. Iron Single-Flange Butterfly: 200 CWP, EPDM seat, aluminum-bronze disc.
 - d. Iron Grooved-End Butterfly: 175 CWP.
 - e. Iron Swing Check: Class 125, metal seats.
 - f. Iron Swing Check with Closure Control: Class 125, lever and spring.
 - g. Iron Grooved-End Swing Check: 300 CWP.
 - h. Iron Center-Guided Check: Class 125, compact-wafer, metal seat.
 - i. Iron Plate-Type Check: Class 125; single plate; metal seat.
 - j. Iron Gate: Class 125, NRS.
 - k. Iron Globe: Class 125.

2.02 GENERAL REQUIREMENTS

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
- B. Valve Sizes: Match upstream piping unless otherwise indicated.
- C. Valve Actuator Types:

1. Handwheel: Valves other than quarter-turn types.
2. Hand Lever: Quarter-turn valves 6 NPS and smaller except plug valves.
- D. Valves in Insulated Piping: With 2 NPS stem extensions and the following features:
 1. Gate Valves: Rising stem.
 2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 3. Butterfly Valves: Extended neck.
 4. Memory Stops: Fully adjustable after insulation is installed.
- E. Valve-End Connections:
 1. Threaded End Valves: ASME B1.20.1.
 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
 3. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
 4. Solder Joint Connections: ASME B16.18.
 5. Grooved End Connections: AWWA C606.
- F. General ASME Compliance:
 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
 2. Solder-joint Connections: ASME B16.18.
 3. Building Services Piping Valves: ASME B31.9.
- G. Potable Water Use:
 1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
 2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.
- H. Valve Bypass and Drain Connections: MSS SP-45.
- I. Source Limitations: Obtain each valve type from a single manufacturer.

2.03 BRONZE, ANGLE VALVES

- A. Class 125: CWP Rating: 200 psig.
 1. Comply with MSS SP-80, Type 1.
 2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
 3. Ends: Threaded.
 4. Stem: Bronze.
 5. Disc: Bronze.
 6. Packing: Asbestos free.
 7. Handwheel: Bronze or aluminum.

2.04 BRASS, BALL VALVES

- A. One-Piece, Reduced-Port with Brass Trim:
 1. Comply with MSS SP-110.
 2. CWP Rating: 400 psig.
 3. Body: Forged brass.
 4. Ends: Threaded.
 5. Seats: PTFE.
 6. Stem: Brass.
 7. Ball: Chrome-plated brass.
- B. Two Piece, Full Port with Brass Trim and Threaded Connections:
 1. Comply with MSS SP-110.
 2. SWP Rating: 150 psig.
 3. CWP Rating: 600 psig, WOG.
 4. Body: Forged brass.
 5. Seats: PTFE.
 6. Ball: Chrome-plated brass.
 7. Manufacturers:

- a. Apollo Valves.
 - b. Ferguson Enterprises Inc.
 - c. Jomar Valves, a division of Jomar Group.
 - d. Substitutions: See Section 016000 - Product Requirements.
- C. Two Piece, Full Port with Press Connection:
 - 1. CWP Rating: 250 psig, WOG.
 - 2. Body: Forged brass.
 - 3. Seats: EPDM.
 - 4. Ball: Chrome-plated brass.
 - 5. Blow-out Proof Stem: Forged brass.
 - 6. Maximum Service Temperature: 250 deg F.
 - 7. Manufacturers:
 - a. Jomar Valves, a division of Jomar Group.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.05 BRONZE, BALL VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. One Piece, Reduced Port with Bronze Trim:
 - 1. Comply with MSS SP-110.
 - 2. SWP Rating: 400 psig.
 - 3. CWP Rating: 600 psig.
 - 4. Body: Bronze.
 - 5. Ends: Press.
 - 6. Seats: PTFE.

2.06 BRONZE, SWING CHECK VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125 CWP Rating; 200 psig (1,380 kPa) WOG:
 - 1. Comply with MSS SP-80, Type 3.
 - 2.
 - 3. Design: Y-pattern, horizontal or vertical flow.
 - 4. Body: Bronze, ASTM B62.
 - 5. Ends: Threaded.
 - 6. Disc: Bronze.

2.07 BRONZE, GATE VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. NRS (Non-rising Stem) or OS & Y (Rising Stem):
 - 1. Comply with MSS SP-80, Type I.
 - 2. Class 125: CWP Rating 200 psig.
 - 3. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 - 4. Ends: Threaded or solder joint joint.
 - 5. Stem: Bronze.
 - 6. Disc: Solid wedge; bronze.
 - 7. Packing: Asbestos free.
 - 8. Handwheel: Malleable iron, bronze, or aluminum.

2.08 BRONZE, GLOBE VALVES

- A. General:
 - 1. Fabricate from dezincification resistant material.
 - 2. Copper alloys containing more than 15 percent zinc are not permitted.
- B. Class 125: CWP Rating 200 psig:
 - 1. Comply with MSS SP-80, Type 1.
 - 2. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
 - 3. Ends: Threaded joint.
 - 4. Stem: Bronze.
 - 5. Disc: PTFE.
 - 6. Packing: Asbestos free.
 - 7. Handwheel: Malleable Iron.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Discard all packing materials and verify that valve interior, including threads and flanges are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

3.02 INSTALLATION

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Where valve support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- D. Install check valves where necessary to maintain direction of flow as follows:
 - 1. Lift Check: Install with stem plumb and vertical.
 - 2. Swing Check: Install horizontal maintaining hinge pin level.
- E. Provide chainwheels on operators for valves 4 NPS and larger where located 96 NPS or more above finished floor, terminating 60 NPS above finished floor.

END OF SECTION

**SECTION 220529
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Beam clamps.
- B. Pipe hangers.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 055000 - Metal Fabrications.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping 2022.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates 2018.
- G. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures 1999 (Reapproved 2022).
- H. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- I. FM (AG) - FM Approval Guide Current Edition.
- J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
- K. UL (DIR) - Online Certifications Directory Current Edition.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.

- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Comply with latest requirements of ANSI Code for building piping and applicable building code.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Provide required hardware to hang or support piping, equipment, or fixtures with related accessories as necessary to complete installation of plumbing work.
- B. Provide hardware products listed, classified, and labeled as suitable for intended purpose.
- C. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
- D. Materials for Metal Fabricated Supports: Comply with Section 055000.
 - 1. Zinc-Plated Steel: Electroplated in accordance with ASTM B633 unless stated otherwise.
 - 2. Galvanized Steel: Hot-dip galvanized in accordance with ASTM A123/A123M or ASTM A153/A153M unless stated otherwise.

- E. Corrosion Resistance: Use corrosion-resistant metal-based materials fully compatible with exposed piping materials and suitable for the environment where installed.

2.02 BEAM CLAMPS

- A. Manufacturers:
 - 1. Anvil, an ASC Engineered Solution.
 - 2. B-Line, a brand of Eaton Corporation.
 - 3. FNW.
 - 4. Unistrut, a brand of Atkore International, Inc.
 - 5. Piping Technology.
 - 6. Walraven.
 - 7. Substitutions: See Section 016000 - Product Requirements.
 - 8. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
- B. MSS SP-58 types 19 through 23, 25 or 27 through 30 based on required load.
- C. C-Clamp: MSS SP-58 type 23, malleable iron with plain finish.
- D. Small or Junior Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish. For inverted usage provide manufacturer listed size(s).
- E. Wide Mouth Beam Clamp: MSS SP-58 type 19, malleable iron with plain finish.
- F. Centerload Beam Clamp with Extension Piece: MSS SP-58 type 30, malleable iron with plain finish.
- G. FM (AG) and UL (DIR) Approved Beam Clamp: MSS SP-58 type 19, plain finish.
- H. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- I. Material: ASTM A395/A395M ductile iron, ASTM A36/A36M carbon steel, ASTM A47/A47M malleable iron, ASTM A181/A181M forged steel, or ASTM A283/A283M steel.

2.03 PIPE HANGERS

- A. Swivel Ring Hangers, Adjustable:
 - 1. Manufacturers:
 - a. B-Line, a brand of Eaton Corporation; 3170NF.
 - b. Anvil, an ASC Engineered Solution; 69 or 70.
 - c. Substitutions: See Section 016000 - Product Requirements.
 - d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - 2. Pipe Sizes: For use with pipes 1/2-inch through 2-inch.
 - 3. MSS SP-58 type 10, epoxy-painted, zinc-colored.
 - 4. Material: ASTM A36/A36M carbon steel.
 - 5. FM (AG) and UL (DIR) listed for specific pipe size runs and loads.
- B. Clevis Hangers, Adjustable:
 - 1. Manufacturers:
 - a. B-Line, a brand of Eaton Corporation; B3100.
 - b. Anvil, an ASC Engineered Solution; 260.
 - c. Substitutions: See Section 016000 - Product Requirements.
 - d. Source Limitations: Furnish hardware, fittings, and accessories from single manufacturer.
 - 2. Pipe Sizes: For use with pipe sizes 1/2-inch and larger.
 - 3. Copper Tube: MSS SP-58 type 1, epoxy-plated copper.
 - 4. Standard-Duty: MSS SP-58 type 1, zinc-colored, epoxy plated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- G. Secure fasteners according to manufacturer's recommended torque settings.
- H. Remove temporary supports.

END OF SECTION

SECTION 220548
VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vibration-isolated equipment support bases.
- B. Vibration isolators.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete.

1.03 DEFINITIONS

- A. Plumbing Component: Where referenced in this section in regards to seismic controls, applies to any portion of the plumbing system subject to seismic evaluation in accordance with applicable codes, including distributed systems (e.g., piping).
- B. Seismic Restraint: Structural members or assemblies of members or manufactured elements specifically designed and applied for transmitting seismic forces between components and the seismic force-resisting system of the structure.

1.04 REFERENCE STANDARDS

1.05 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate selection and arrangement of vibration isolation and/or seismic control components with the actual equipment to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Seismic Controls:
 - a. Coordinate the arrangement of seismic restraints with piping, conduit, equipment, and other potential conflicts installed under other sections or by others.
 - b. Coordinate the work with other trades to accommodate relative positioning of essential and nonessential components in consideration of seismic interaction.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.06 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

1.07 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.

- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.08 QUALITY ASSURANCE

- A. Comply with applicable building code.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

- A. Vibration-Isolated Structural Steel Bases:
 - 1. Description: Engineered structural steel frames with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
- B. Vibration-Isolated Concrete Inertia Bases:
 - 1. Description: Concrete-filled engineered steel forms with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
 - 2. Minimum Base Depth: 6 inches.
 - 3. Minimum Base Mass (Including Concrete): 1.5 times weight of supported equipment.
 - 4. Concrete Reinforcement: Welded or tied reinforcing bars running both ways in a single layer.
 - 5. Concrete: Filled on site with minimum 3000 psi concrete in accordance with Section 033000.
 - 6. Pump Applications: Size and configure bases for piping elbow supports as required.

2.02 VIBRATION ISOLATORS

- A. General Requirements:
 - 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
 - 2. Spring Elements for Spring Isolators:
 - a. Color code or otherwise identify springs to indicate load capacity.
 - b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
 - c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.
 - d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
 - e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
 - f. Selected to function without undue stress or overloading.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect vibration isolation and/or seismic control components for damage and defects.
- C. Provide manufacturer representative or authorized technician services to assist with inspection and testing of vibration isolation systems and seismic controls. Submit a detailed copy of manufacturer recommended inspection, testing, and field report procedures.
- D. Correct deficiencies and replace damaged or defective vibration isolation and/or seismic control components.

END OF SECTION

**SECTION 220553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Pipe markers.

1.02 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials 2017.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Schedules:
 - 1. Submit plumbing component identification schedule listing equipment, piping, and valves.
 - 2. Detail proposed component identification data in terms of of wording, symbols, letter size, and color coding to be applied to corresponding product.
 - 3. Valve Data Format: Include id-number, location, function, and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Samples: Submit two tags, labels, pipe markers, and size used on project.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 PLUMBING COMPONENT IDENTIFICATION GUIDELINE

- A. Nameplates:
 - 1. Water heaters and other heat transfer products.
 - 2. Pumps, Tanks, and other plumbing equipment products.
- B. Tags:
 - 1. Piping: 3/4 inch diameter and smaller.
 - 2. Manual operated and automated control valves.
- C. Pipe Markers: 3/4 inch diameter and higher.

2.02 NAMEPLATES

- A. Manufacturers:
 - 1. Brady Corporation.
 - 2. Brimar Industries, Inc.
 - 3. Craftmark Identification Systems.
 - 4. Kolbi Pipe Marker Co.
 - 5. Panduit.
 - 6. Seton Identification Products.
 - 7. Substitutions: See Section 016000 - Product Requirements.
- B. Description: Laminated piece with up to three lines of text.
 - 1. Letter Color: Black.
 - 2. Letter Height: 1/4 inch.
 - 3. Background Color: White.
 - 4. Nameplate Material:
 - a. Flexible: Vinyl with adhesive backing per ASTM D709.
 - b. Metal: Brass with center-side holes for screw fastening.

2.03 TAGS

- A. Manufacturers:
 - 1. Advanced Graphic Engraving.
 - 2. Brady Corporation.
 - 3. Brimar Industries, Inc.
 - 4. Craftmark Pipe Markers.
 - 5. Kolbi Pipe Marker Co.
 - 6. Seton Identification Products.
 - 7. Substitutions: See Section 016000 - Product Requirements.
- B. Flexible: Vinyl with engraved black letters on light contrasting background color with up to three lines of text. Minimum tag size 1-1/2 inch in diameter.
- C. Metal: Brass, 19 gauge 1-1/2 inch in diameter with smooth edges, stamped, smooth edges, and corrosion-resistant ball chain. Up to three lines of text.
- D. Valve Tag Chart: Typewritten 12-point letter size list of applied tags and location plastic laminated.
- E. Piping: 3/4 inch diameter and smaller. Include corrosion resistant chain. Identify service, flow direction, and pressure.

2.04 PIPE MARKERS

- A. Manufacturers:
 - 1. Brady Corporation.
 - 2. Brimar Industries, Inc.
 - 3. Craftmark Pipe Markers.
 - 4. Kolbi Pipe Marker Co.
 - 5. Panduit.

6. Seton Identification Products.
 7. Substitutions: See Section 016000 - Product Requirements.
- B. Comply with ASME A13.1.
- C. Flexible Marker: Factory fabricated, semi-rigid, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid conveyed.
- D. Flexible Tape Marker: Flexible, vinyl film tape with pressure-sensitive adhesive backing and printed markings.
- E. Identification Scheme, ASME A13.1:
1. Primary: External Pipe Diameter, Uninsulated or Insulated.
 2. Secondary: Color scheme per fluid service.
 - a. Water; Potable, Cooling, Boiler Feed, and Other: White text on green background.
 3. Tertiary: Other Details.
 - a. Directional flow arrow.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive identification products.

3.02 INSTALLATION

- A. Install flexible nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags in clear view and align with axis of piping.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe marker around pipe in accordance with manufacturer's instructions.
- E. Apply ASME A13.1 Pipe Marking Rules:
1. Place pipe marker adjacent to changes in direction.
 2. Place pipe marker adjacent each valve port and flange end.
 3. Place pipe marker at both sides of floor and wall penetrations.
 4. Place pipe marker every 25 to 50 feet interval of straight run.

END OF SECTION

**SECTION 221005
PLUMBING PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sanitary waste piping, buried within 5 feet of building.
- B. Sanitary waste piping, above grade.
- C. Domestic water piping, buried within 5 feet of building.
- D. Domestic water piping, above grade.
- E. Storm drainage piping, buried within 5 feet of building.
- F. Storm drainage piping, above grade.

1.02 RELATED REQUIREMENTS

- A. Section 220529 - Hangers and Supports for Plumbing Piping and Equipment.
- B. Section 220553 - Identification for Plumbing Piping and Equipment.
- C. Section 220719 - Plumbing Piping Insulation.
- D. Section 330110.58 - Disinfection of Water Utility Piping Systems.

1.03 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- C. ASME B31.9 - Building Services Piping 2020.
- D. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Potable Water Distribution Systems 2020.
- E. ASTM B32 - Standard Specification for Solder Metal 2020.
- F. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes 2020.
- G. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.
- H. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
- I. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.
- J. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.
- K. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings 2020a.
- L. ASTM C1277 - Standard Specification for Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings 2020.
- M. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems 2020.
- N. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings 2020.
- O. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets 2020.
- P. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2021.
- Q. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- R. AWWA C550 - Protective Interior Coatings for Valves and Hydrants 2017.

- S. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications 2021.
- T. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications 2020.
- U. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
- V. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- W. NSF 372 - Drinking Water System Components - Lead Content 2022.
- X. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- C. Shop Drawings: For non-penetrating rooftop supports, submit detailed layout developed for this project, with design calculations for loadings and spacings.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.

- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.
- B. Plenum-Installed Waste Piping: Flame-spread index equal or below 25 and smoke-spread index equal or below 50 according to ASTM E84 or UL 723 tests. Provide fire barrier wrap for all piping that does not meet this requirement in spaces used as return air plenums.

2.02 SANITARY WASTE PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: CISPI 301, hubless.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
- B. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY WASTE PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- B. PVC Pipe: ASTM D2665.
 - 1. Fittings: PVC.
 - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Copper Pipe: ASTM B42, hard drawn.
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.

2.05 DOMESTIC WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), TypeLL (B), Drawn (H).
 - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
 - 2. Joints: ASTM B32, alloy Sn95 solder.
 - 3. Mechanical Press Sealed Fittings: Double-pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.
 - a. Manufacturers:
 - 1) Anvil International: www.anvilintl.com/#sle.
 - 2) Apollo Valves: www.apollovalves.com/#sle.
 - 3) Viega LLC: www.viega.us/#sle.
 - 4) Substitutions: See Section 016000 - Product Requirements.

2.06 STORM DRAINAGE PIPING, BURIED WITHIN 5 FEET OF BUILDING

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 - 1. Fittings: Cast iron.
 - 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- B. PVC Pipe: ASTM D2665 or ASTM D3034.
 - 1. Fittings: PVC.

2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.07 STORM DRAINAGE PIPING, ABOVE GRADE

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
 1. Fittings: Cast iron.
 2. Joints: Neoprene gaskets and stainless steel clamp-and-shield assemblies.
- B. PVC Pipe: ASTM D2665.
 1. Fittings: PVC.
 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.08 PIPE FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 2 inch and Under:
 1. Ferrous Pipe: Class 150 malleable iron threaded unions.
- B. Flanges for Pipe Sizes Over 2 inch:
 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
- C. No-Hub Couplings:
 1. Testing: In accordance with ASTM C1277 and CISPI 310.
 2. Gasket Material: Neoprene complying with ASTM C564.
 3. Band Material: Stainless steel.
 4. Eyelet Material: Stainless steel.
 5. Manufacturers:
 - a. MIFAB, Inc.
 - b. Tyler Pipe.
 - c. Substitutions: See Section 016000 - Product Requirements.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

2.09 PIPE HANGERS AND SUPPORTS

- A. See Section 220529 for additional requirements.
- B. Provide hangers and supports that comply with MSS SP-58.
 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
 3. Trapeze Hangers: Welded steel channel frames attached to structure.
 4. Vertical Pipe Support: Steel riser clamp.
- C. Plumbing Piping - Drain, Waste, and Vent:
 1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 2. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
- D. Plumbing Piping - Water:
 1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
 2. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
 3. Hangers for Hot Pipe Sizes 2 to 4 inch: Carbon steel, adjustable, clevis.
 4. Hangers for Hot Pipe Sizes 6 inch and Larger: Adjustable steel yoke, cast iron pipe roll, double hanger.

2.10 BALANCING VALVES

- A. Manufacturers:
 1. Anvil International: www.anvilintl.com/#sle.
 2. ITT Bell & Gossett: www.bellgossett.com/#sle.
 3. Jomar Valves, a division of Jomar Group: www.jomarvalve.com/#sle.
 4. Griswold Controls: www.griswoldcontrols.com/#sle.
 5. Taco, Inc: www.taco-hvac.com/#sle.

6. Substitutions: See Section 016000 - Product Requirements.
- B. Construction: Class 125, brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- C. Manual Operated Y-Pattern Globe, Size 1/2 to 2 inch:
 1. Class 125, bronze body, multi-turn handwheel, memory stop, variable orifice, soldered connections, dual PT (hot and cold pressure-temperature) test ports for 300 psi, minus 4 to 250 deg F WOG service.
- D. Automatic Flow Limiting Cartridge, Size 3/4 inch:
 1. Class 125, bronze body, stainless steel cartridge, threaded connections with built-in union, dual PT (hot and cold pressure-temperature) test ports for 400 psi, 0.5 gpm WOG service.
- E. Automatic Flow Limiting Cartridge with Ball Valve, Size 1/2 to 1 inch:
 1. Class 125, bronze body, stainless steel cartridge, leak-proof stem, threaded or soldered connections with built-in union, dual PT (hot and cold pressure-temperature) test ports for 400 psi, 0.25 to 1.5 gpm WOG service.
- F. Calibration: Control flow within five percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

2.11 PRESSURE REDUCING VALVES

- A. Pressure Reducing and Pressure Sustaining Valves:
 1. Size: 1/2 to 40 inch, Class 150 flange ends.
 2. ASSE 1003 and AWWA C550 compliant cast iron body, elastomeric diaphragm, seat disc and epoxy coated both internally and externally.
 3. Pressure Reducing Pilot-Operator:
 - a. Operating Range: 5 to 50 psi.
 - b. Connected into brass, bronze, or stainless steel pilot piping and fittings.
 - c. Precision fixed-flow restrictor, pressure gauges, and isolation valves.
 - d. Include pilot-side strainer on valve sizes above 4 inch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install valves with stems upright or horizontal, not inverted. See Section 220523.
- C. Install water piping to ASME B31.9.
- D. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.
- E. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- F. Pipe Hangers and Supports:

3.04 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.

- C. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- D. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install globe valves for throttling, bypass, or manual flow control services.
- F. Provide lug end butterfly valves adjacent to equipment when provided to isolate equipment.
- G. Provide spring-loaded check valves on discharge of water pumps.
- H. Provide flow controls in water recirculating systems where indicated.

3.05 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.

3.06 FIELD TESTS AND INSPECTIONS

- A. Verify and inspect systems according to requirements by the Authority Having Jurisdiction. In the absence of specific test and inspection procedures proceed as indicated below.
- B. Domestic Water Systems:
 - 1. Perform hydrostatic testing for leakage prior to system disinfection.
 - 2. Test Preparation: Close each fixture valve or disconnect and cap each connected fixture.
 - 3. General:
 - a. Fill the system with water and raise static head to 10 psi above service pressure. Minimum static head of 50 to 150 psi. As an exception, certain codes allow a maximum static pressure of 80 psi.
- C. Gas Distribution Systems:
 - 1. Test Preparation: Close each appliance valve or disconnect and cap each connected appliance.
 - 2. General Systems:
 - a. Inject a minimum of 10 psi of compressed air into the piping system for a duration of 15 minutes and verify with a gauge that no perceptible pressure drop is measured.
 - b. Ensure test pressure gauge has a range of twice the specific pressure rate selected with an accuracy of 1/10 of 1 pound.
- D. Test Results: Document and certify successful results, otherwise repair, document, and retest.

3.07 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Disinfect water distribution system in accordance with Section 330110.58.
- B. Prior to starting work, verify system is complete, flushed, and clean.

3.08 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work, check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new water service complete with approved water meter with by-pass valves, pressure reducing valve, and sand strainer.

END OF SECTION

**SECTION 221006
PLUMBING PIPING SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Drains.
- B. Cleanouts.
- C. Hose bibbs.
- D. Hydrants.
- E. Backflow preventers.
- F. Double check valve assemblies.
- G. Water hammer arrestors.
- H. Sumps.
- I. Sanitary waste interceptors.
- J. Catch basins and manholes.

1.02 RELATED REQUIREMENTS

- A. Section 221005 - Plumbing Piping.
- B. Section 223000 - Plumbing Equipment.
- C. Section 224000 - Plumbing Fixtures.
- D. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ASME A112.6.3 - Floor and Trench Drains 2019.
- B. ASME A112.6.4 - Roof, Deck, and Balcony Drains 2022.
- C. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- D. NSF 372 - Drinking Water System Components - Lead Content 2022.
- E. PDI-WH 201 - Water Hammer Arresters 2017.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- C. Manufacturer's Instructions: Indicate Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- D. Operation Data: Indicate frequency of treatment required for interceptors.
- E. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.
- F. Project Record Documents: Record actual locations of equipment, cleanouts, backflow preventers, water hammer arrestors.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Loose Keys for Outside Hose Bibbs: One.

1.05 SUSTAINABLE DESIGN SUBMITTALS

1.06 THE OWNER IS SEEKING A PARKSMART CERTIFICATION (THE LEED CERTIFICATION FOR PARKING GARAGES) FOR THIS BUILDING, INCLUDING WORK RELATED TO THIS SPECIFICATION SECTION. THE GOALS PROVIDED BELOW ARE REQUIREMENTS AND NECESSARY TO INCLUDE IN THE BIDS FOR THE ENTIRE DURATION OF THE PROJECT. SEE THE PROJECT PARKSMART REQUIREMENTS SECTION 01 81 13 FOR ADDITIONAL INFORMATION AND REQUIREMENTS. TRACKED INFORMATION TO BE PROVIDED TO GENERAL CONTRACTOR / CONSTRUCTION MANAGER FOR THE PROJECT TO BE ASSEMBLED AND PRESENTED TO THE OWNER AND DESIGN TEAM MONTHLY.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

- A. Area Drains:
 1. Assembly: ASME A112.6.4.
 2. Body: Galvanized cast iron with sump.
 3. Strainer: Square nickel-bronze.
 4. Accessories: Membrane flange and membrane clamp with integral gravel stop, with adjustable under deck clamp.
- B. Floor Drains:
 1. Manufacturers:
 - a. Jay R. Smith Manufacturing Company.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. Watts Water Technologies.
 - e. Zurn Plumbing Products.
 - f. Substitutions: See Section 016000 - Product Requirements.

- C. Floor Drain (FD-1):
 - 1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

2.03 CLEANOUTS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Josam Company: www.josam.com/#sle.
 - 3. Watts Water Technologies.
 - 4. Zurn Industries, LLC: www.zurn.com/#sle.
 - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Cleanouts at Interior Finished Floor Areas (FCO-1):
 - 1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.
- C. Cleanouts at Interior Finished Wall Areas (WCO-1):
 - 1. Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.

2.04 HOSE BIBBS

- A. Manufacturers:
 - 1. Watts Regulator Company: www.wattsregulator.com/#sle.
 - 2. Woodford Manufacturing Company.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Interior Hose Bibbs:
 - 1. Bronze with integral mounting flange, replaceable hexagonal disc, hose thread spout, chrome plated where exposed with handwheel, integral vacuum breaker in compliance with ASSE 1011.

2.05 HYDRANTS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 2. Josam Company.
 - 3. Watts Water Technologies.
 - 4. Woodford Manufacturing Company.
 - 5. Zurn Industries, LLC: www.zurn.com/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Wall Hydrants:
 - 1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, lockshield and removable key, and integral vacuum breaker.

2.06 BACKFLOW PREVENTERS

- A. Reduced Pressure Backflow Preventers:
 - 1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.07 DOUBLE CHECK VALVE ASSEMBLIES

- A. Double Check Valve Assemblies:
 - 1. ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent.

2.08 WATER HAMMER ARRESTORS

- A. Manufacturers:
 - 1. Cash Acme, a brand of Reliance Worldwide Corporation: www.cashacme.com/#sle.
 - 2. Jay R. Smith Manufacturing Company: www.jayrsmith.com/#sle.
 - 3. Sioux Chief Manufacturing Company.
 - 4. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com/#sle.
 - 5. Zurn Industries, LLC: www.zurn.com/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Water Hammer Arrestors:
 - 1. Copper construction, piston type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range 34 to 250 degrees F and maximum 250 psi working pressure.

2.09 SANITARY WASTE INTERCEPTORS

- A. Manufacturers:
 - 1. Jay R. Smith Manufacturing Company: www.jrsmith.com/#sle.
 - 2. MIFAB, Inc: www.mifab.com/#sle.
 - 3. Zurn Industries, LLC: www.zurn.com/#sle.
 - 4. Striem.
 - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Sand/Sediment Interceptors:
 - 1. Epoxy coated cast iron body and secured cover with removable stainless steel sediment bucket.

2.10 RELIEF VALVES

- A. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

2.11 FLOOR DRAIN TRAP SEALS

- A. Description: Push-fit EPDM or silicone fitting with a one-way membrane.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.
- C. Encase exterior cleanouts in concrete flush with grade.
- D. Install floor cleanouts at elevation to accommodate finished floor.
- E. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.
- F. Pipe relief from backflow preventer to nearest drain.
- G. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks or washing machine outlets.
- H. Install air chambers on hot and cold water supply piping to each fixture or group of fixtures (each washroom). Fabricate same size as supply pipe or 3/4 inch minimum, and minimum 18 inches long.

END OF SECTION

**SECTION 223000
PLUMBING EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tankless electric water heaters.

1.02 RELATED REQUIREMENTS

- A. Section 220548 - Vibration and Seismic Controls for Plumbing Piping and Equipment.
- B. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Current Edition.
- B. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data:
 - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
 - 2. Indicate pump type, capacity, power requirements.
 - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
 - 4. Provide electrical characteristics and connection requirements.
- C. Project Record Documents: Record actual locations of components.
- D. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- E. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements for additional provisions.
 - 2. Extra Pump Seals: One of each type and size.
 - 3. Extra Water Softener Salt: 50 pounds.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.

- b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Certifications:
 - 1. Gas Water Heaters: AHRI Directory of Certified Product Performance.
 - 2. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- C. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- D. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.01 WATER HEATERS

- A. Manufacturers:
 - 1. A.O. Smith Water Products Co: www.hotwater.com/#sle.
 - 2. Bock Water Heaters, Inc: www.bockwaterheaters.com/#sle.
 - 3. Rheem Manufacturing Company: www.rheem.com/#sle.
 - 4. Lochinvar, LLC; <https://www.lochinvar.com/products/water-heaters/>.
 - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Tankless Electric Water Heater:
 - 1. Minimum Efficiency Required: ASHRAE Std 90.1 I-P.
 - 2. Heater Type: Self-contained, wall-mounted unit capable of handling listed capacity, water-inlet strainer, removable thermally-insulated front panel, and threaded water pipe-end connections.
 - 3. Heater-Heat Exchanger: Stainless steel, thermally insulated and encased assembly in corrosion-resistant steel jacket; baked-on enamel finish.
 - 4. Safeties: Provide internal safeties for water flow, electrical load, and thermal load.
 - 5. Controls: Color touchscreen interface for internal controls; temperature range adjustable from 120 to 170 degrees F using flanged or screw-in nichrome elements. Wire double-

element units so elements do not operate simultaneously.

2.02 ELECTRICAL WORK

- A. Electrical characteristics to be as specified or indicated.
- B. Furnish motor starters complete with thermal overload protection and other appurtenances necessary for the motor control specified.
- C. Supply manual or automatic control and protective or signal devices required for the operation specified, and any control wiring required for controls and devices not shown.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.
- C. Commercial Gas-Fired Water Heaters:
 - 1. Install water heaters on concrete bases.
 - 2. Connect equipment to water and drain piping using unions or flanges and isolation valves.
 - 3. Size temperature and relief valves in accordance with CSA ratings. Pipe temperature and pressure relief valves to floor drain.
 - 4. Adjust compression tank pre-charge to scheduled minimum operating pressure prior to connecting to system.
 - 5. Install gas shutoff valves on gas supplies to gas water heaters without shutoff valves.
 - 6. Install gas pressure regulators on gas supplies to gas water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
 - 7. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 - 8. Install automatic gas valves on gas supplies to gas water heaters, if required for operation of safety control.
 - 9. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater, relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
 - 10. Install thermometer on outlet piping of water heaters.

END OF SECTION

**SECTION 224000
PLUMBING FIXTURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Mop sinks.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. ASME A112.6.1M - Floor-Affixed Supports for Off-the-Floor Plumbing Fixtures for Public Use 1997 (Reaffirmed 2017).
- B. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- C. NSF 372 - Drinking Water System Components - Lead Content 2022.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.
- C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept fixtures on site in factory packaging. Inspect for damage.
- B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for electric water cooler.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 MOP SINKS

- A. Mop Sink Manufacturers:
 - 1. Acorn Engineering Company.
 - 2. Just Manufacturing Company.
 - 3. Zurn Industries, Inc.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Grid Strainer: Stainless steel; integral; removable.
- C. Dimensions: As indicated on drawings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.
- B. Verify that electric power is available and of the correct characteristics.

3.02 PREPARATION

- A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

- A. Install each fixture with trap, easily removable for servicing and cleaning.
- B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.
- C. Install components level and plumb.
- D. Install and secure fixtures in place with wall supports and bolts.
- E. Solidly attach water closets to floor with lag screws. Lead flashing is not intended hold fixture in place.

3.04 ADJUSTING

- A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.05 CLEANING

- A. Clean plumbing fixtures and equipment.

3.06 PROTECTION

- A. Protect installed products from damage due to subsequent construction operations.
- B. Do not permit use of fixtures by construction personnel.
- C. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

**SECTION 230513
COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General construction and requirements.
- B. Applications.
- C. Single phase electric motors.
- D. Three phase electric motors.

1.02 REFERENCE STANDARDS

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015 (Reaffirmed 2020).
- B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators 2017.
- C. NEMA MG 1 - Motors and Generators 2021.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- D. Operation Data: Include instructions for safe operating procedures.
- E. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of electric motors for HVAC use, and their accessories, with minimum three years documented product development, testing, and manufacturing experience.
- B. Comply with NFPA 70.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Provide five year manufacturer warranty for motors larger than 20 horsepower.

PART 2 PRODUCTS

2.01 GENERAL CONSTRUCTION AND REQUIREMENTS

- A. Electrical Service:
 - 1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
 - 2. Motors Larger than 1/2 Horsepower: 460 volts, three phase, 60 Hz.
- B. Construction:
 - 1. Open drip-proof type except where specifically noted otherwise.
 - 2. Design for continuous operation in 104 degrees F environment.
 - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
 - 4. Motors 1 HP and larger, except specially wound motors and inline pump motors 56 frame and smaller: High energy efficient type.
- C. Explosion-Proof Motors: UL approved and labelled for hazard classification, with over temperature protection.
- D. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- E. Wiring Terminations:
 - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
 - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

2.02 APPLICATIONS

- A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not comply with these specifications.
- B. Single phase motors for shaft mounted fans and centrifugal pumps: Split phase type.
- C. Single phase motors for shaft mounted fans or blowers: Permanent split capacitor type.
- D. Single phase motors for fans, pumps, blowers, and air compressors: Capacitor start type.
- E. Motors located in exterior locations, draw through cooling towers, air cooled condensers, humidifiers, direct drive axial fans, explosion proof environments, and dust collection systems: Totally enclosed type.

2.03 SINGLE PHASE POWER - SPLIT PHASE MOTORS

- A. Starting Torque: Less than 150 percent of full load torque.

- B. Starting Current: Up to seven times full load current.
- C. Breakdown Torque: Approximately 200 percent of full load torque.
- D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.04 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

2.05 SINGLE PHASE POWER - CAPACITOR START MOTORS

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.
- E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
- F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

2.06 THREE PHASE POWER - SQUIRREL CAGE MOTORS

- A. Starting Torque: Between 1 and 1-1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Comply with NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- I. Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112.
- J. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

END OF SECTION

**SECTION 230517
SLEEVES AND SLEEVE SEALS FOR HVAC PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe sleeves.
- B. Manufactured sleeve-seal systems.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 230716 - HVAC Equipment Insulation.

1.03 REFERENCE STANDARDS

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022a.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

- A. Vertical Piping:
 - 1. Sleeve Length: 1 inch above finished floor.
 - 2. Provide sealant for watertight joint.
 - 3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
 - 4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
- B. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
- C. Pipe Passing Through Below Grade Exterior Walls:
 - 1. Zinc coated or cast iron pipe.
 - 2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
- D. Clearances:
 - 1. Provide allowance for insulated piping.
 - 2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
 - 3. All Rated Openings: Caulked tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

- A. Manufacturers:
 - 1. Advance Products & Systems, LLC; Innerlynx: www.apsonline.com/#sle.
 - 2. Flexicraft Industries; PipeSeal: www.flexicraft.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Modular/Mechanical Seal:
 - 1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.

2. Provide watertight seal between pipe and wall/casing opening.
3. Elastomer element size and material in accordance with manufacturer's recommendations.
4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

3.02 INSTALLATION

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
- B. Install piping to conserve building space, to not interfere with use of space and other work.
- C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- D. Inserts:
 1. Provide inserts for placement in concrete formwork.
 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
- E. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
 1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
 2. Aboveground Piping:
 - a. Pack solid using mineral fiber in compliance with ASTM C592.
 - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
 3. All Rated Openings: Caulk tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
 4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
- F. Manufactured Sleeve-Seal Systems:
 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
 3. Locate piping in center of sleeve or penetration.
 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
 5. Tighten bolting for a water-tight seal.
 6. Install in accordance with manufacturer's recommendations.
- G. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.03 CLEANING

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

**SECTION 230529
HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Support and attachment components for equipment, piping, and other HVAC/hydronic work.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 230548 - Vibration and Seismic Controls for HVAC.

1.03 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping 2022.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).
- F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- H. MFMA-4 - Metal Framing Standards Publication 2004.
- I. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
- J. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

1.06

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with MSS SP-58.
 - 2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
 - 3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
 - 6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
 - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

- d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
 - 2. Channel Material:
 - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
 - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
 - 3. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
 - 4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
- C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
 - a. Equipment Supports: 1/2 inch diameter.
 - b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
 - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
 - d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.
- D. Thermal Insulated Pipe Supports:
 - 1. General Construction and Requirements:
 - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
 - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
 - c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
 - d. Insulation inserts to consist of rigid polyisocyanurate (urethane) or Calcium silicate insulation surrounded by a galvanized steel protection shield with a minimum 180-degree coverage on bottom supported piping and full 360-degree coverage on clamped piping..
- E. Pipe Supports:
 - 1. Liquid Temperatures Up To 122 degrees F:
 - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
 - b. Support From Below: MSS SP-58 Types 35 through 38.
 - 2. Operating Temperatures from 122 to 446 degrees F:
 - a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
 - b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
 - c. Sliding Support: MSS SP-58 Types 35 through 38.
- F. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
 - 1. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
 - 2. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- G. Riser Clamps: MSS SP-58 Type 8, carbon steel riser clamp.
 - 1. Provide copper plated clamps for copper tubing support.
 - 2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
- H. Strut Clamps: Two-piece pipe clamp.
- I. Insulation Clamps: Two bolt-type clamps designed for installation under insulation.
- J. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
 - 1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
 - 2. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.

- K. Intermediate Pipe Guides: Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.
 - 1. Pipe Diameter 6 inches and Smaller: Provide minimum clearance of 0.16 inch.
 - 2. Pipe Diameter 8 inches: Provide U-bolts with double nuts providing minimum clearance of 0.28 inch.
 - 3. Pipe Diameter 8 inches: 0.625 inch U-bolt.
 - 4. Pipe Diameter 10 inches: 0.75 inch U-bolt.
 - 5. Pipe Diameter 12 to 16 inches: 0.875 inch U-bolt.
 - 6. Pipe Diameter 18 to 30 inches: 1 inch U-bolt.
- L. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- M. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
 - 1. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
 - 2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 3. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
 - 4. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
- N. Pipe Insulation Protection Shields:
 - 1. MSS SP-58 Type 40.
 - 2. Shield Material: Galvanized carbon steel of not less than 18-gauge.
 - 3. For use on insulated pipe with outer diameter 2-1/2-inch and larger.
 - 4. Minimum Shield Length: 12-inches.
- O. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 - 4. Hollow Masonry: Use toggle bolts.
 - 5. Hollow Stud Walls: Use toggle bolts.
 - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 - 7. Sheet Metal: Use sheet metal screws.
 - 8. Wood: Use wood screws.
 - 9. Plastic and lead anchors are not permitted.
 - 10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4.
 - b. Channel Material: Use galvanized steel.
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.

- B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
- C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
- G. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 - 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.
 - 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
- I. Secure fasteners according to manufacturer's recommended torque settings.
- J. Remove temporary supports.

END OF SECTION

**SECTION 230548
VIBRATION AND SEISMIC CONTROLS FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Vibration isolation requirements.
- B. Vibration-isolated equipment support bases.
- C. Vibration isolators.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete.
- B. Section 230529 - Hangers and Supports for HVAC Piping and Equipment.

1.03 REFERENCE STANDARDS

- A. ASHRAE (HVACA) - ASHRAE Handbook - HVAC Applications Most Recent Edition Cited by Referring Code or Reference Standard.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for products, including materials, fabrication details, dimensions, and finishes.
 - 1. Vibration Isolators: Include rated load capacities and deflections; include information on color coding or other identification methods for spring element load capacities.
- C. Shop Drawings - Vibration Isolation Systems:
 - 1. Include dimensioned plan views and sections indicating proposed arrangement of vibration isolators; indicate equipment weights and static deflections.
 - 2. Vibration-Isolated Equipment Support Bases: Include base weights, including concrete fill where applicable; indicate equipment mounting provisions.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATION REQUIREMENTS

- A. Design and provide vibration isolation systems to reduce vibration transmission to supporting structure from vibration-producing HVAC equipment and/or HVAC connections to vibration-isolated equipment.
- B. Comply with applicable general recommendations of ASHRAE (HVACA), where not in conflict with other specified requirements:
- C. General Requirements:
 - 1. Select vibration isolators to provide required static deflection.
 - 2. Select vibration isolators for uniform deflection based on distributed operating weight of actual installed equipment.
 - 3. Select vibration-isolated equipment support bases and associated vibration isolators to provide minimum 1-inch operating clearance beneath base unless otherwise indicated.
- D. Equipment Isolation: As indicated on drawings.
- E. Piping Isolation:
 - 1. Provide vibration isolators for piping supports:
 - a. Located within 100 pipe diameters or three supports, whichever is greater, of connected vibration-isolated equipment and pressure-regulating valve (PRV) stations.
 - 2. Minimum Static Deflection:
 - a. First Three Supports Closest to Isolated Equipment: Same as static deflection of equipment; maximum of 2 inch deflection required.
 - b. Remainder of Supports: 0.75 inch deflection unless otherwise indicated.
 - 3. Suspended Piping, Nonseismic Applications: Use resilient material isolator hangers, spring isolator hangers, or combination resilient material/spring isolator hangers.
 - 4. Floor-Mounted Piping, Nonseismic Applications: Use open (unhoused) spring isolators.
 - 5. Use modular seal or approved resilient material where vibration-isolated piping penetrates building elements (e.g., walls, floors) arranged to prevent vibration transmission to structure.

2.02 VIBRATION-ISOLATED EQUIPMENT SUPPORT BASES

- A. Type S - Vibration-Isolated Structural Steel Bases:
 - 1. Description: Engineered structural steel frames with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
- B. Type IB - Vibration-Isolated Concrete Inertia Bases:
 - 1. Description: Concrete-filled engineered steel forms with integral mounting provisions for vibration isolators, sized and configured for mounting of equipment.
 - 2. Minimum Base Depth: 6 inches.
 - 3. Minimum Base Mass (Including Concrete): 1.5 times weight of supported equipment.
 - 4. Concrete Reinforcement: Welded or tied reinforcing bars running both ways in a single layer.
 - 5. Concrete: Filled on site with minimum 3000 psi concrete in accordance with Section 033000.

2.03 VIBRATION ISOLATORS

- A. General Requirements:
 - 1. Resilient Materials for Vibration Isolators: Oil, ozone, and oxidant resistant.
 - 2. Spring Elements for Spring Isolators:
 - a. Color code or otherwise identify springs to indicate load capacity.
 - b. Lateral Stability: Minimum lateral stiffness to vertical stiffness ratio of 0.8.
 - c. Designed to operate in the linear portion of their load versus deflection curve over deflection range of not less than 50 percent above specified deflection.

- d. Designed to provide additional travel to solid of not less than 50 percent of rated deflection at rated load.
 - e. Selected to provide designed deflection of not less than 75 percent of specified deflection.
 - f. Selected to function without undue stress or overloading.
- B. Vibration Isolators for Nonseismic Applications:
 - 1. Type 1 - Resilient Material Isolator Pads:
 - a. Description: Single or multiple layer waffle pads utilizing elastomeric (e.g. neoprene, rubber) isolator material.
 - b. Pad Thickness and Size: As required for 40 durometer load rating.
 - c. Multiple Layer Pads: Provide bonded, galvanized sheet metal separation plate between each layer.
 - d. Products:
 - 1) Mason Type WSW.
 - 2) Substitutions: See Section 016000 - Product Requirements.
 - 2. Type 5 - Spring Isolator Hangers, Nonseismic:
 - a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) in series with an elastomeric (e.g. neoprene, rubber) element for the lower hanger rod connection.
 - b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.
 - c. Products:
 - 1) Mason Type 30.
 - 2) Substitutions: See Section 016000 - Product Requirements.
 - 3. Type 7 - Combination Resilient Material/Spring Isolator Hangers, Nonseismic:
 - a. Description: Isolator assembly designed for installation in hanger rod suspension system utilizing single or multiple free-standing, laterally stable steel spring(s) for the lower hanger rod connection and elastomeric (e.g. neoprene, rubber) isolator material for the upper hanger rod connection.
 - b. Designed to accommodate misalignment of bottom hanger rod up to 30 degrees (plus/minus 15 degrees) without short-circuiting of isolation.
 - c. Products:
 - 1) Mason Type 30N.
 - 2) Substitutions: See Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive vibration isolation and/or seismic control components and associated attachments.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- C. Secure fasteners according to manufacturer's recommended torque settings.
- D. Install flexible piping connections to provide sufficient slack for vibration isolation and/or seismic relative displacements as indicated or as required.
- E. Vibration Isolation Systems:
 - 1. Vibration-Isolated Equipment Support Bases:
 - a. Provide specified minimum clearance beneath base.

2. Spring Isolators:
 - a. Position equipment at operating height; provide temporary blocking as required.
 - b. Lift equipment free of isolators prior to lateral repositioning to avoid damage to isolators.
 - c. Level equipment by adjusting isolators gradually in sequence to raise equipment uniformly such that excessive weight or stress is not placed on any single isolator.
3. Isolator Hangers:
 - a. Use precompressed isolator hangers where required to facilitate installation and prevent damage to equipment utility connection provisions.
 - b. Locate isolator hangers at top of hanger rods in accordance with manufacturer's instructions.
4. Clean debris from beneath vibration-isolated equipment that could cause short-circuiting of isolation.
5. Use elastomeric grommets for attachments where required to prevent short-circuiting of isolation.
6. Adjust isolators to be free of isolation short circuits during normal operation.
7. Do not overtighten fasteners such that resilient material isolator pads are compressed beyond manufacturer's maximum recommended deflection.

END OF SECTION

**SECTION 230553
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe markers.
- E. Ceiling tacks.

1.02 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

- A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials 2017.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- C. Product Data: Provide manufacturers catalog literature for each product required.
- D. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- E. Project Record Documents: Record actual locations of tagged valves.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 NAMEPLATES

- A. Letter Color: White.
- B. Letter Height: 1/2 inch.
- C. Background Color: Black.
- D. Plastic: 1/16-inch thick plastic laminate, beveled edges, screw mounting. Comply with ASTM D709.

2.02 TAGS

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.03 STENCILS

- A. Stencils: With clean cut symbols and letters of following size:
 - 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
 - 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
 - 3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
 - 4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
 - 5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
 - 6. Ductwork and Equipment: 2-1/2 inch high letters.
- B. Stencil Paint: As specified in Section 099123, semi-gloss enamel, colors complying with ASME A13.1.

2.04 PIPE MARKERS

- A. Color: Comply with ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- E. Color code as follows:
 - 1. Heating, Cooling, and Boiler Feedwater: Green with white letters.
 - 2. Compressed Air: Blue with white letters.

2.05 CEILING TACKS

- A. Description: Steel with 3/4 inch diameter color coded head.
- B. Color code as follows:
 - 1. HVAC Equipment: Yellow.
 - 2. Fire Dampers and Smoke Dampers: Red.
 - 3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 099123 for stencil painting.

3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 099123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- G. Use tags on piping 3/4 inch diameter and smaller.
 - 1. Identify service, flow direction, and pressure.
 - 2. Install in clear view and align with axis of piping.
 - 3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- H. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

**SECTION 230593
TESTING, ADJUSTING, AND BALANCING FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of refrigerating systems.
- C. Measurement of final operating condition of HVAC systems.

1.02 RELATED REQUIREMENTS

- A. Section 014000 - Quality Requirements: Employment of testing agency and payment for services.

1.03 REFERENCE STANDARDS

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems 2008, with Errata (2019).
- C. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems 2019.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing 2002.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
 - 1. Submit six weeks prior to starting the testing, adjusting, and balancing work.
 - 2. Include certification that the plan developer has reviewed Contract Documents, the equipment and systems, and the control system with the Architect and other installers to sufficiently understand the design intent for each system.
 - 3. Include at least the following in the plan:
 - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
 - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
 - c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
 - d. Final test report forms to be used.
 - e. Detailed step-by-step procedures for TAB work for each system and issue, including:
 - 1) Terminal flow calibration (for each terminal type).
 - 2) Diffuser proportioning.
 - 3) Branch/submain proportioning.
 - 4) Total flow calculations.
 - 5) Rechecking.
 - 6) Diversity issues.
 - f. Expected problems and solutions, etc.
 - g. Criteria for using air flow straighteners or relocating flow stations and sensors; analogous explanations for the water side.
 - h. Details of how TOTAL flow will be determined; for example:
 - 1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
 - 2) Water: Pump curves, circuit setter, flow station, ultrasonic, etc.

- i. Specific procedures that will ensure that both air and water side are operating at the lowest possible pressures and methods to verify this.
 - j. Confirmation of understanding of the outside air ventilation criteria under all conditions.
 - k. Method of verifying and setting minimum outside air flow rate will be verified and set and for what level (total building, zone, etc.).
 - l. Method of checking building static and exhaust fan and/or relief damper capacity.
 - m. Proposed selection points for sound measurements and sound measurement methods.
 - n. Methods for making coil or other system plant capacity measurements, if specified.
 - o. Time schedule for TAB work to be done in phases (by floor, etc.).
 - p. Description of TAB work for areas to be built out later, if any.
 - q. Time schedule for deferred or seasonal TAB work, if specified.
 - r. False loading of systems to complete TAB work, if specified.
 - s. Exhaust fan balancing and capacity verifications, including any required room pressure differentials.
 - t. Procedures for field technician logs of discrepancies, deficient or uncompleted work by others, contract interpretation requests and lists of completed tests (scope and frequency).
 - u. Procedures for formal progress reports, including scope and frequency.
 - v. Procedures for formal deficiency reports, including scope, frequency and distribution.
- C. Field Logs: Submit at least twice a week to the Construction Manager.
- D. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- E. Progress Reports.
- F. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
- 1. Submit under provisions of Section 014000.
 - 2. Revise TAB plan to reflect actual procedures and submit as part of final report.
 - 3. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
 - 4. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
 - 5. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
 - 6. Units of Measure: Report data in I-P (inch-pound) units only.
 - 7. Include the following on the title page of each report:
 - a. Name of Testing, Adjusting, and Balancing Agency.
 - b. Address of Testing, Adjusting, and Balancing Agency.
 - c. Telephone number of Testing, Adjusting, and Balancing Agency.
 - d. Project name.
 - e. Project location.
 - f. Project Architect.
 - g. Project Engineer.
 - h. Project Contractor.
 - i. Project altitude.
 - j. Report date.
- G. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are

requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Perform total system balance in accordance with one of the following:
 1. AABC (NSTSB), AABC National Standards for Total System Balance.
 2. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
 2. Having minimum of three years documented experience.
 3. Certified by one of the following:
 - a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
 - b. NEBB, National Environmental Balancing Bureau: www.nebb.org/#sle.
 - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
 1. Systems are started and operating in a safe and normal condition.
 2. Temperature control systems are installed complete and operable.
 3. Proper thermal overload protection is in place for electrical equipment.
 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.

5. Duct systems are clean of debris.
 6. Fans are rotating correctly.
 7. Fire and volume dampers are in place and open.
 8. Air coil fins are cleaned and combed.
 9. Access doors are closed and duct end caps are in place.
 10. Air outlets are installed and connected.
 11. Duct system leakage is minimized.
 12. Service and balance valves are open.
- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

3.03 PREPARATION

- A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.

3.04 ADJUSTMENT TOLERANCES

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.05 RECORDING AND ADJUSTING

- A. Field Logs: Maintain written logs including:
1. Running log of events and issues.
 2. Discrepancies, deficient or uncompleted work by others.
 3. Contract interpretation requests.
 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.06 AIR SYSTEM PROCEDURE

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- E. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

- G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.
- H. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- I. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- J. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.
- K. Where modulating dampers are provided, take measurements and balance at extreme conditions. Balance variable volume systems at maximum air flow rate, full cooling, and at minimum air flow rate, full heating.
- L. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

3.07 MINIMUM DATA TO BE REPORTED

- A. Electric Motors:
 - 1. Manufacturer.
 - 2. Model/Frame.
 - 3. HP/BHP.
 - 4. Phase, voltage, amperage; nameplate, actual, no load.
 - 5. RPM.
 - 6. Service factor.
 - 7. Starter size, rating, heater elements.
 - 8. Sheave Make/Size/Bore.
- B. V-Belt Drives:
 - 1. Identification/location.
 - 2. Required driven RPM.
 - 3. Driven sheave, diameter and RPM.
 - 4. Belt, size and quantity.
 - 5. Motor sheave diameter and RPM.
 - 6. Center to center distance, maximum, minimum, and actual.
- C. Air Moving Equipment:
 - 1. Location.
 - 2. Manufacturer.
 - 3. Model number.
 - 4. Serial number.
 - 5. Arrangement/Class/Discharge.
 - 6. Air flow, specified and actual.
 - 7. Return air flow, specified and actual.
 - 8. Outside air flow, specified and actual.
 - 9. Total static pressure (total external), specified and actual.
 - 10. Inlet pressure.
 - 11. Discharge pressure.
 - 12. Sheave Make/Size/Bore.
 - 13. Number of Belts/Make/Size.
 - 14. Fan RPM.
- D. Exhaust Fans:
 - 1. Location.
 - 2. Manufacturer.
 - 3. Model number.
 - 4. Serial number.

5. Air flow, specified and actual.
 6. Total static pressure (total external), specified and actual.
 7. Inlet pressure.
 8. Discharge pressure.
 9. Sheave Make/Size/Bore.
 10. Number of Belts/Make/Size.
 11. Fan RPM.
- E. Duct Traverses:
1. System zone/branch.
 2. Duct size.
 3. Area.
 4. Design velocity.
 5. Design air flow.
 6. Test velocity.
 7. Test air flow.
 8. Duct static pressure.
 9. Air temperature.
 10. Air correction factor.
- F. Terminal Unit Data:
1. Manufacturer.
 2. Type, constant, variable, single, dual duct.
 3. Identification/number.
 4. Location.
 5. Model number.
 6. Size.
 7. Minimum static pressure.
 8. Minimum design air flow.
 9. Maximum design air flow.
 10. Maximum actual air flow.
 11. Inlet static pressure.

END OF SECTION

**SECTION 230713
DUCT INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Duct insulation.
- B. Duct liner.
- C. Insulation jackets.

1.02 RELATED REQUIREMENTS

- A. Section 230553 - Identification for HVAC Piping and Equipment.
- B. Section 233100 - HVAC Ducts and Casings: Glass fiber ducts.

1.03 REFERENCE STANDARDS

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
- D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- E. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation 2014 (Reapproved 2019).
- F. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation 2020.
- G. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material) 2019.
- H. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings 2019 (Reapproved 2022).
- I. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers 2015.
- J. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- K. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- L. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015, with Editorial Revision (2021).
- M. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- N. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- C. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the

project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1. Project Goals

- a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
- b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.

B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.

C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.
- b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than five years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum five years of experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density and thickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

C. Do not store insulation materials on grade or where they are at risk of becoming wet. Do not install insulation products that have been exposed to water.

1.08 FIELD CONDITIONS

A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.

B. Maintain temperature during and after installation for minimum period of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723, with following exceptions:

1. Insulation installed outdoors may have a Flame spread index/Smoke developed index of 75/150.

B. Insulation materials shall be asbestos free.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:

1. CertainTeed Corporation: www.certainteed.com/#sle.
2. Johns Manville: www.jm.com/#sle.
3. Knauf Insulation: www.knaufinsulation.com/#sle.
4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.

5. Substitutions: See Section 016000 - Product Requirements.
- B. Insulation: ASTM C553; flexible, noncombustible blanket.
 1. K value: 0.30 at 75 degrees F (0.75 pcf density), when tested in accordance with ASTM C518.
 2. Maximum Service Temperature: 250 degrees F.
 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C. Vapor Barrier Jacket:
 1. Kraft paper reinforced with glass fiber yarn and bonded to vapor barrier film. Facing as required for the application.
 - a. Aluminum Faced: Aluminum foil-scrim-kraft (FSK) facing.
 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 3. Puncture Resistance: 25 units minimum.
 4. Secure with outward clinching staples and seal with pressure sensitive tape or two coats vapor barrier mastic and glass fabric.
- D. Vapor Barrier Tape:
 1. Manufacturers:
 - a. VentureTape.
 - b. Listed insulation manufacturer.
 - c. Substitutions: See Section 016000 - Product Requirements
 2. Kraft paper reinforced with glass fiber yarn and bonded to vapor barrier film matching insulation jacket type and color, with pressure sensitive acrylic or rubber based adhesive.
- E. Indoor Vapor Barrier Mastic:
 1. Vinyl emulsion type acrylic or synthetic latex mastic, compatible with insulation, white color.

2.03 GLASS FIBER, RIGID

- A. Manufacturer:
 1. CertainTeed Corporation: www.certainteed.com/#sle.
 2. Johns Manville: www.jm.com/#sle.
 3. Knauf Insulation: www.knaufinsulation.com/#sle.
 4. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
- B. Insulation: ASTM C612; rigid, noncombustible blanket.
 1. K Value: 0.23 at 75 degrees F, when tested in accordance with ASTM C518.
 2. Maximum Service Temperature: 450 degrees F.
 3. Maximum Water Vapor Absorption: 5.0 percent.
 4. Maximum Density: 3.0 lb/cu ft.
- C. Vapor Barrier Jacket:
 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
 - a. Aluminum Faced: Aluminum foil-scrim-kraft (FSK) facing.
 2. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
 3. Secure with mechanical fasteners and seal with pressure sensitive tape or two coats vapor barrier mastic and glass fiber.
- D. Vapor Barrier Tape:
 1. Manufacturers:
 - a. VentureTape.
 - b. Listed insulation manufacturer.
 - c. Substitutions: See Section 016000 - Product Requirements
 2. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, matching insulation jacket type and color, with pressure sensitive acrylic or rubber based adhesive.
- E. Indoor Vapor Barrier Finish:
 1. Manufacturers:

- a. Design Polymerics: www.designpoly.com/#sle.
- b. Substitutions: See Section 016000 - Product Requirements
2. Cloth: Untreated; 9 oz/sq yd weight, glass fabric.
3. Vinyl emulsion type acrylic or synthetic latex mastic, compatible with insulation, white color.

2.04 JACKETS

- A. Fabric Reinforced Mastic Jacket (FMJ): UL listed 6 oz/sq yd plain weave cotton or glass fiber reinforced fabric treated with dilute fire retardant lagging adhesive.
 1. Lagging Adhesive:
 - a. Manufacturers:
 - 1) Design Polymerics; DP 3050 Water Based, Zero VOC, Premium Quality, Lagging Adhesive, and Vapor Retarder: www.designpoly.com/#sle.
 - 2) Substitutions: See Section 016000 - Product Requirements
 - b. Compatible with insulation.
- B. Self-Adhering Jacket (SAJ): Flexible Weather-Proofing Outdoor Self-healing, field-applied cladding.
 1. Material: Aluminum foil/polymer laminate with rubberized asphalt layer and acrylic adhesive.
 2. Thickness: 34 mils.
 3. Finish: Embossed.
 4. Color: Silver.
 5. Water Vapor Transmission: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
 6. Mold Resistance: Pass when tested in accordance with ASTM C1338.
 7. Emissivity: 0.030 when tested in accordance with ASTM C1371.
 8. Manufacturers:
 - a. Polyguard Products; Alumaguard All-Weather: www.polyguardproducts.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements

2.05 DUCT LINER

- A. Manufacturers:
 1. Armacell LLC: www.armacell.us/#sle.
 2. CertainTeed Corporation: www.certainteed.com/#sle.
 3. Johns Manville: www.jm.com/#sle.
 4. Knauf Insulation: www.knaufinsulation.com/#sle.
 5. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
 6. Substitutions: See Section 016000 - Product Requirements.
- B. Note: Choose the liner type - Elastomeric Foam or Glass Fiber.
- C. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket, rigid board, and preformed round liner board; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
 1. Fungal Resistance: No growth when tested according to ASTM G21.
 2. Apparent Thermal Conductivity: Maximum of 0.24 at 75 degrees F.
 3. Service Temperature: Up to 250 degrees F.
 4. Rated Velocity on Coated Air Side for Air Erosion: 6,000 fpm, minimum.
 5. Minimum Noise Reduction Coefficients:
 - a. 1/2 inch Thickness: 0.50.
 - b. 1 inch Thickness: 0.70.
 - c. 1-1/2 inches Thickness: 0.80.
 - d. 2 inch Thickness: 0.95.
- D. Adhesive: Waterproof, fire-retardant type, ASTM C916.
- E. Liner Fasteners: Galvanized steel, self-adhesive pad with integral head.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Test ductwork for design pressure prior to applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated Ducts Conveying Air Below Ambient Temperature:
 - 1. Provide insulation with vapor barrier jackets.
 - 2. Finish with tape and vapor barrier jacket.
 - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
 - 4. Insulate entire system, including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Insulated Ducts Conveying Air Above Ambient Temperature:
 - 1. Provide with or without standard vapor barrier jacket.
 - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
- E. Insulated Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with vapor barrier jacket or canvas jacket sized for finish painting.
- F. External Duct Insulation Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
 - 2. Secure insulation without vapor barrier with staples, tape, or wires.
 - 3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
 - 4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
- G. Duct Liner Application:
 - 1. Locate longitudinal joints at corners of duct only.
 - 2. Cut and fit to assure lapped, compressed joints.
 - 3. Provide metal nosing on leading edge where lined duct is preceded by unlined duct.
 - 4. Adhere insulation with adhesive for 90 percent coverage.
 - 5. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
 - 6. Seal and smooth joints. Seal and coat transverse joints.
 - 7. Seal liner surface penetrations with adhesive.
 - 8. Duct dimensions indicated are net inside dimensions required for air-flow. Increase duct size to allow for insulation thickness.

3.03 SCHEDULES

- A. Combustion Air Duct:
 - 1. Flexible Glass Fiber Duct Insulation: 1.5 inchesthick.
- B. Exhaust Ducts Downstream of Motorized Backdraft Dampers:
 - 1. Rigid Glass Fiber Duct Insulation: 2 inchesthick.
- C. Exposed Supply Air Ducts and Outside Air Intake Ducts:
 - 1. Rigid Glass Fiber Duct Insulation: 2 inches thick.
 - 2. Exposed supply ducts located entirely in space they are serving do not require insulation.

END OF SECTION

**SECTION 230913
INSTRUMENTATION AND CONTROL DEVICES FOR HVAC**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Control panels.
- B. Control Valves:
 - 1. Ball valves and actuators.
 - 2. Globe pattern.
 - 3. Butterfly pattern.
 - 4. Electronic operators.
- C. Dampers.
- D. Damper Operators:
 - 1. Electric operators.
- E. Input/Output Sensors:
 - 1. Temperature sensors.
 - 2. Equipment operation (current) sensors.
 - 3. Nitrogen dioxide sensors.
 - 4. Carbon monoxide sensors.
- F. Thermostats:
 - 1. Electric room thermostats.
 - 2. Line voltage thermostats.
 - 3. Room thermostat accessories.

1.02 RELATED REQUIREMENTS

- A. Section 230519 - Meters and Gauges for HVAC Piping: Thermometer sockets and gauge taps.
- B. Section 230923 - Direct-Digital Control System for HVAC.
- C. Section 230993 - Sequence of Operations for HVAC Controls.
- D. Section 232113 - Hydronic Piping: Installation of control valves, flow switches, temperature sensor sockets, and gauge taps.
- E. Section 232114 - Hydronic Specialties.
- F. Section 233300 - Air Duct Accessories: Installation of automatic dampers.
- G. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating 2018.
- B. ANSI/FCI 70-2 - Control Valve Seat Leakage 2021.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NEMA DC 3 - Residential Controls - Electrical Wall-Mounted Room Thermostats 2013.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
- C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.
- D. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.

- E. Project Record Documents: Record actual locations of control components, including panels, thermostats, and sensors. Accurately record actual location of control components, including panels, thermostats, and sensors.
 - 1. Revise shop drawings to reflect actual installation and operating sequences.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience approved by manufacturer.
- C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.01 EQUIPMENT - GENERAL

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

2.02 CONTROL PANELS

- A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.
- B. NEMA 250, general purpose utility enclosures with enameled finished face panel.
- C. Provide common keying for all panels.

2.03 CONTROL VALVES

- A. Ball Valves and Actuators:

1. Service: Use for chilled water or hot water.
2. Flow Characteristic: Include 2-way and 3-way diverting operation configured to fail normally closed (NC).
3. Replacements in Kind: Provide pressure-independent type.
4. Rangeability: 500 to 1.
5. ANSI Rating: Class 150.
6. Leakage: Class IV (0.1 percent of rated capacity) per ANSI/FCI 70-2.
7. Body Size:
 - a. Under 2-1/2 inches:
 - 1) Connection: NPT.
 - 2) Materials:
 - (a) Body: Brass.
 - (b) Flanges: Ductile iron.
 - (c) Ball: Chrome-plated brass.
 - (d) Stem: Nickel-plated brass.
 - (e) Seat: Graphite-reinforced PTFE with EPDM O-Ring backing.
 - (f) Stem Seal: EPDM O-Rings.
 - (g) Flow Control Disk: Thermoplastic synthetic-resin.
 - b. 2-1/2 inches and Above:
 - 1) Connection Type: Flanged.
 - 2) Materials:
 - (a) Body: Brass.
 - (b) Flanges: Ductile iron.
 - (c) Ball: 300 series stainless steel.
 - (d) Stem: 300 series stainless steel.
 - (e) Seat: Graphite-reinforced PTFE with EPDM O-Ring backing.
 - (f) Stem Seal: EPDM O-Rings.
 - (g) Flow Control Disk: Thermoplastic synthetic-resin.
 - c. Service Temperature:
 - 1) Fluid Side: 0 to 284 degrees F liquid or 25 psig steam.
 - 2) Ambient Side: From minus 4 to 122 degrees F.
8. Actuator Requirements:
 - a. Assembly: Factory-mounted.
 - b. Input: 0 to 10 VDC configured for proportional control.
 - c. Accessories: Provide with valve position indicator and manual override.
- B. Globe Pattern:
 1. Up to 2 inches: Bronze body, bronze trim, rising stem, renewable composition disc, screwed ends.
 2. Over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
 3. Hydronic Systems:
 - a. Rate for service pressure of 125 psig at 250 degrees F.
 - b. Replaceable plugs and seats of stainless steel.
 - c. Size for 5 psig maximum pressure drop at design flow rate.
 - d. Two-way valves shall have equal percentage characteristics, three way valves linear characteristics. Size two-way valve operators to close valves against pump shut off head.
- C. Butterfly Pattern:
 1. Iron body, bronze disc, resilient replaceable seat for service to 250 degrees F wafer or lug ends, extended neck.
 2. Hydronic Systems:
 - a. Rate for service pressure of 125 psig at 250 degrees F.
 - b. Size for 1 psig maximum pressure drop at design flow rate.

- D. Electronic Operators:
 - 1. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.
 - 2. Select operator for full shut off at maximum pump differential pressure.

2.04 DAMPERS

- A. Performance: Test in accordance with AMCA 500-D.
- B. Frames: Galvanized steel, welded or riveted with corner reinforcement, minimum 12 gauge, 0.1046 inch.
- C. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gauge, 0.0299 inch, attached to minimum 1/2 inch shafts with set screws.
- D. Dampers protecting outside air intake or exhaust ducts shall have full thermal break with insulated blades.
- E. Blade Seals: Synthetic elastomeric, inflatable, mechanically attached, field replaceable.
- F. Jamb Seals: Spring stainless steel.
- G. Shaft Bearings: Oil impregnated sintered bronze.
- H. Linkage Bearings: Oil impregnated sintered bronze.
- I. Leakage: Less than one percent based on approach velocity of 2000 ft per min and 4 inches wg.
- J. Maximum Pressure Differential: 6 inches wg.
- K. Temperature Limits: Minus 40 to 200 degrees F.

2.05 DAMPER OPERATORS

- A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
 - 1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
 - 2. Provide one operator for maximum 36 sq ft damper section.
- B. Electric Operators:
 - 1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.

2.06 INPUT/OUTPUT SENSORS

- A. Temperature Sensors:
 - 1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
 - 2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
 - 3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
 - 4. Temperature Sensing Device: Compatible with project DDC controllers.
 - 5. Performance Characteristics:
 - a. RTD:
 - 1) Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
 - 2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
 - 3) Chilled Water Accuracy: Plus/minus 0.50 degrees F minimum.
 - 4) Range: Minus 40 degrees F through 220 degrees F minimum.
 - b. Thermistor:
 - 1) Accuracy (All): Plus/minus 0.36 degrees F minimum.
 - 2) Range: Minus 25 degrees F through 122 degrees F minimum.
 - 3) Heat Dissipation Constant: 2.7 mW per degree C.
 - c. Temperature Transmitter:

- 1) Accuracy: 0.10 degree F minimum or plus/minus 0.20 percent of span.
 - 2) Output: 4 to 20 mA.
 - d. Sensing Range:
 - 1) Provide limited range sensors if required to sense the range expected for a respective point.
 - e. Outside Air Sensors: Watertight inlet fitting shielded from direct rays of the sun.
 - f. Immersion Temperature Sensors: A sensor encased in a corrosion-resistant probe with an indoor junction box service entry body.
 - g. Room Temperature Sensors with Integral Digital Display:
 - 1) Construct for surface or wall box.
 - 2) Provide a four button keypad with the following capabilities:
 - (a) Indication of space temperatures.
 - (b) Setpoint adjustment to accommodate room setpoint, DDC Input/Output Points List, and Sequence of Operation.
 - (c) Manual occupancy override and indication of occupancy status.
 - h. Temperature Averaging Elements:
 - 1) Use on duct sensors for ductwork 10 sq ft or larger.
- B. Equipment Operation (Current) Sensors:
1. Status Inputs for Fans: Differential pressure switch with adjustable range of 0 to 5 inches wg.
 2. Status Inputs for Pumps: Differential pressure switch piped across pump with adjustable pressure differential range of 8 to 60 psi.
 3. Status Inputs for Electric Motors: Current sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.

2.07 THERMOSTATS

- A. Electric Room Thermostats:
1. Type: NEMA DC 3, 24 volts, with setback/setup temperature control.
 2. Covers: Locking with set point adjustment, without thermometer.
- B. Line Voltage Thermostats:
1. Integral manual On/Off/Auto selector switch, single or two pole as required.
 2. Dead Band: Maximum 2 degrees F.
 3. Cover: Locking with set point adjustment, with thermometer.
 4. Rating: Motor load.
- C. Room Thermostat Accessories:
1. Insulating Bases: For thermostats located on exterior walls.
 2. Thermostat Guards: Metal mounted on separate base.
 3. Aspirating Boxes: Where indicated for thermostats requiring flush installation.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that systems are ready to receive work.
- C. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Mount compressor and tank unit on vibration isolation consisting of springs, with minimum 1 inch static deflection and 1 inch clearance to floor. Isolate air supply with wire-braid reinforced rubber hose or polyethylene tubing. Pipe manual and automatic drains to nearest floor drain.
- C. Supply instrument air from compressor units through filter, pressure reducing valve, pressure relief valve, with pressure gauges, and shutoff and bypass valves.

- D. Install pressure reducing stations consisting of pressure reducing valve, particle filter, valve bypass, pressure gauge on inlet and outlet, and pressure relief valve.
- E. Locate refrigerated air dryer in discharge air line from tank. Mount dryer on wall on rubber in shear mounts. Install pressure regulator downstream of dryer. Pipe automatic drain to nearest floor drain.
- F. Use copper tubing in mechanical rooms, where subject to damage or temperatures in excess of 200 degrees F, where adjacent to heating pipes passing through common sleeve, and where not readily accessible. In mechanical rooms bundled plastic tubing with suitable junction boxes or single plastic tubing with tray or raceway may be used.
- G. Solder copper tubing except at instruments or equipment where compression fittings may be used.
- H. Conceal tubing. Run exposed only in mechanical rooms, storage rooms and like, in neat manner and properly supported.
- I. Mechanically attached tubing to supporting surfaces. Sleeve through concrete surfaces in minimum one inch sleeves, extended 6 inches above floors and one inch below bottom surface of slabs.
- J. Purge tubing with dry, oil-free compressed air before connecting control instruments.
- K. Provide instrument air tubing with check and hand valves to expansion tanks with Schrader fittings and hose; refer to Section 232114.
- L. Check and verify location of thermostats and exposed control sensors with plans and room details before installation. Locate 48 inches above floor. Align with lighting switches. Refer to Section 262726.
- M. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.
- N. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
- O. Install "hand/off/auto" selector switches to override automatic interlock controls when switch is in "hand" position.
- P. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

END OF SECTION

**SECTION 230993
SEQUENCE OF OPERATIONS FOR HVAC CONTROLS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.
- B. Sequence of operation for:
 - 1. General control.
 - 2. General exhaust fans.
 - 3. Ductless Split Systems.
 - 4. Electric cabinet and wall heaters.
 - 5. Electric and gas-fired unit heaters.

1.02 RELATED REQUIREMENTS

- A. Section 230913 - Instrumentation and Control Devices for HVAC.
- B. Section 230923 - Direct-Digital Control System for HVAC.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
 - 1. State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in Contract Documents.
 - 2. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
 - 3. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.
- C. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.
 - 1. Label with settings, adjustable range of control and limits.
 - 2. Include flow diagrams for each control system, graphically depicting control logic.
 - 3. Include the system and component layout of all equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
 - 4. Include all monitoring, control and virtual points specified in elsewhere.
 - 5. Include a key to all abbreviations.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1.05 PROJECT GOALS

- a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.

- b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL CONTROL

- A. Setpoints:
 - 1. All setpoints indicated in control specification are to be adjustable.
 - 2. Setpoints shall be readily available to be modified in mechanical system software system summary (textual or graphic based) and under same software level as hardware points.
 - 3. Some less used setpoints may be provided on lower software level, if requested by user for clarity.
 - 4. Setpoints indicated are only specified as calculated starting point (or initial system operation). It is expected that setpoint adjustments and control loop tuning shall be required to provide optimum system operation based on requirements of building.
 - 5. Control contractor shall work with balancing contractor and Owner's Representative to provide final system setpoint adjustments and control loop tuning after system is in operation and building is in use.
 - 6. Document all final setpoints on record drawings. Any questions regarding intended operation of HVAC equipment and control systems shall be referred to HVAC design engineer through appropriate construction communication process.
- B. Anti-cycling:
 - 1. When HVAC equipment or sequence is specified to be started and stopped by temperature, humidity, pressure setpoint or any other controlled variable, there shall be adjustable differential setpoint that shall be set to prevent short cycling of systems and equipment due to minor changes in controlled variable.
 - 2. Temperature differential setpoints shall be set at 2 degrees F and non-temperature setpoints shall be set at 10 percent of controlled range unless otherwise specified.
 - 3. Setpoints shall indicate at when process should be turned on.
 - 4. Heating and cooling differentials shall be set for above setpoint and will be used to turn process off.
 - 5. For example, economizer sequence called to switch at 68 degrees F would turn on at 68 degrees F and off at 70 degrees F since it is cooling function.
 - 6. Heating lockout setpoint of 50 degrees F would turn on heating control at 50 degrees F and off at 52 degrees F. Non-temperature differentials shall be set above setpoint if setpoint is indicating a minimum value or below setpoint if setpoint is indicating a maximum value.
 - 7. Provide minimum runtime timers for loads that are cycled to prevent over-cycling.
 - 8. Timers shall be set as specified or as needed to prevent damage or excessive wear to the equipment.
 - 9. Unless otherwise specified in individual control sequences, fans and pumps shall have a minimum runtime on timers of 15 minutes (adjustable) and off timers of 5 minutes

(adjustable). Safeties shall override runtime timers.

- C. Deadbands:
 - 1. Provide deadbands for all DDC control loops to prevent constant hunting of output signals to controlled devices.
 - 2. Deadbands shall be set to provide adequate control around setpoint as follows unless otherwise specified in individual control sequences:
 - 3. Temperature Control: ± 0.5 degrees F
 - 4. Humidity Control: ± 1 percent RH
 - 5. Airflow Control: ± 2 percent of total flow
 - 6. Static Pressure Control: ± 0.01 in. W.C.
- D. Alarms:
 - 1. Provide all alarmed points with adjustable time delays to prevent nuisance tripping under normal operation and on equipment start-up.
 - 2. For commanded outputs that have status feedback, provide alarm that will indicate commanded output is not in its' commanded state.
 - 3. Provide alarms on all points as indicated on point charts. For existing campus automations systems, add or delete what is called on point charts for after consultation with Owner's Representative to provide consistent alarming throughout automation system.
- E. Equipment Start/Stop Failure States:
 - 1. All start/stop points for equipment shall utilize normally open contacts unless called out specifically in individual control sequences.
- F. Lead/Lag Sequencing:
 - 1. For sequences that call for lead/lag of equipment connected to building automation systems, lead device shall be able to be chosen through selectable day of week and time of day through building automation system.
 - 2. Coordinate with Owner's Representative for scheduling switchover and frequency.
 - 3. Unless otherwise directed, switchover shall occur at 10AM Tuesday and shall rotate lead device on weekly cycle rotating through all devices sequentially.
 - 4. For standalone lead/lag sequence controllers (non-DDC), lead device shall be selected by switch on panel face.
- G. Variable frequency Drive (VFD) Motor Run Status:
 - 1. Use VFD programmable relay dry contact output provided with VFD to prove motor run status and detect belt loss or coupling break.
 - 2. If bypass contactor is provided with VFD, provide adjustable current switch and wire it in parallel with VFD output for proving motor status.
- H. VFD Bypass & Safety Interlocks:
 - 1. VFD's equipped with bypass starters shall be interlocked so that start/stop and safety circuits that are called out for VFD operation shall be functional when VFD is indexed to bypass starter mode.
 - 2. Unless otherwise specified in sequence below, switch from inverter to bypass starter modes shall be through manual switch provided on VFD/bypass starter package.
- I. VFD Minimum Speed and Ramp Timers:
 - 1. VFD start-up technician shall work with Temperature Control Contractor determine minimum speed required for motor controlled by VFD to provide cooling of motor as installed to prevent heat related problems.
 - 2. This minimum speed shall be set in VFD controller.
 - 3. VFD start-up technician shall work with DDC Temperature Control Contractor to set acceleration and deceleration timers in VFD controller at 30 seconds for motors less than 40 HP and 60 seconds for motors 40 HP and greater.
- J. Current Switch Setup:
 - 1. When current switches are used for proving fan or pump status, they shall be set up so that they will detect belt or coupling loss by reduction in current draw on loss of coupled load.

2. Current switch set up shall be redone by Control Contractor after balancer is complete.
- K. Damper Interlocks for Fans with Starters:
 1. For fan systems with magnetic starters and shutoff dampers specified with end switches, damper interlock shall be hardwired in such a way that damper shall open if fan starter Hand / Off / Auto switch is in hand or in auto position and being called to start.
 2. After damper end switch has proven damper open, hardwire interlock from end switch to starter holding coil for fan shall cause fan to start.
 3. For fan systems that are ducted in parallel, see specific sequence for fan system on interlock requirements.
- L. Damper Interlocks for Fans with VFDs:
 1. For fan systems with VFD's and shutoff dampers specified with end switches, damper end switches shall be hardwire interlocked to safety circuit(s) of VFD to prevent fan from starting until damper is proven open.
 2. This interlock shall prevent fan from running in VFD or bypass (if provided) mode. Damper end switch shall also be monitored by DDC system.
 3. For fan systems that are ducted in parallel, see specific sequence for fan system on interlock requirements.
- M. Fan Interlocking:
 1. Provide interlocks between supply and return or exhaust fan systems as scheduled on plans or called out in individual control sequences.
 2. If DDC controlled, interlocks shall be done through DDC start/stop points unless otherwise specified in individual control sequences.
 3. If not DDC controlled, interlocks shall be accomplished via hardwire interlocks between fan starters or VFD's.
- N. Thermostats and Sensors:
 1. All devices and equipment including terminal units, specified to be controlled in control sequence by thermostat or sensor, shall be provided with thermostat or sensor, whether or not device is indicated on Drawings.
 2. Consult HVAC Design Engineer for thermostat or sensor location, if not indicated on Drawings.
- O. Original Equipment Manufacturer (OEM) Controller DDC Integration:
 1. Provide DDC programming to define all equipment integral input/output points, setpoints, data points, calculations, etc. that are available through manufacturers communication interface.
 2. Consult with Owner's DDC operations personnel to determine if some of points should be omitted for clarity or lack of value.
 3. The following equipment shall be integrated into the DDC system:
 - a. Variable Frequency Drives
 - b. VAV Terminal Units
 - c. Hot water Boilers.
 - d. Packaged Dedicated Outside Make-up Air Conditioning Units
- P. Weekly Scheduling:
 1. Provide scheduling of DDC terminal units in groups based on occupancy.
 2. Work with Owner's Representative to determine how many groups are required and which zones should be included.
 3. Individual terminal units shall be able to receive temporary schedules that will override group schedules.
 4. Temporary override buttons at zone sensor, where specified on point charts shall override scheduling to occupied mode.
 5. When groups that consist of more than 20 percent of terminal units are indexed to occupied, associated air handling unit shall start if not already running.

3.02 GENERAL EXHAUST FANS

A. General Exhaust Fans

1. Each exhaust fan shall be indexed to operate continuously during building occupied hours.
2. During occupied hours, motorized control damper associated with each exhaust fan shall open fully and fan motor shall start. During unoccupied hours, exhaust fan motor shall stop and motorized control damper shall close fully.
3. Provide any/all control interlock wiring required between fan motor starter/control contactor and building control system.

3.03 DUCTLESS SPLIT SYSTEMS

- A. Cooling only Ductless Split Systems
 1. Room thermostat furnished by unit manufacturer shall control indoor unit and outdoor unit to maintain room cooling temperature setpoint.
- B. Heat/Cool Ductless Heat Pump Split Systems
 1. Room thermostat furnished by unit manufacturer shall control indoor unit and outdoor unit to maintain room heating and cooling temperature setpoints.
 2. During occupied hours indoor unit supply fan shall operate continuously with outside air intake damper open.
 3. During unoccupied hours system shall be allowed to cycle to maintain room unoccupied heating and cooling temperature setpoints.

3.04 ELECTRIC CABINET AND WALL HEATERS

- A. Single temperature thermostat mounted in cabinet return air set at 65 degrees F maintains constant space temperature by cycling unit fan motor and electric heating elements.
 1. Integral thermostat continues fan operation until element temperature falls below 100 degrees F.
- B. Ceiling mounted heaters shall be provided will remote, wall-mounted, stand-alone control thermostats.

3.05 ELECTRIC AND GAS-FIRED UNIT HEATERS

- A. Single temperature, stand-alone room thermostat set at 65 degrees F maintains constant space temperature by cycling unit fan motor and energizing electric heating elements (electric unit heaters) or gas burner (gas-fired unit heaters).
- B. Integral thermostat continues fan operation until element temperature falls below 100 degrees F.

END OF SECTION

**SECTION 231123
FACILITY NATURAL-GAS PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for natural gas piping systems.

1.02 RELATED REQUIREMENTS

- A. Section 099113 - Exterior Painting.
- B. Section 230516 - Expansion Fittings and Loops for HVAC Piping.
- C. Section 230553 - Identification for HVAC Piping and Equipment.

1.03 REFERENCE STANDARDS

- A. ANSI Z21.18/CSA 6.3 - Gas Appliance Pressure Regulators 2019.
- B. ANSI Z21.80/CSA 6.22 - Line Pressure Regulators 2019.
- C. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
- D. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
- E. ASME B31.1 - Power Piping 2022.
- F. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- G. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2023.
- H. MSS SP-78 - Gray Iron Plug Valves, Flanged and Threaded Ends 2011.
- I. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

1.05 SUSTAINABLE DESIGN SUBMITTALS

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 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.

- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Welding Materials and Procedures: Comply with ASME BPVC-IX and applicable state labor regulations.
- C. Welder Qualifications: Certified in accordance with ASME BPVC-IX.
- D. Identify pipe with marking including size, ASTM material classification, and ASTM specification.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.08 FIELD CONDITIONS

PART 2 PRODUCTS

2.01 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.
 - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
 - 2. Joints: Threaded or welded to ASME B31.1.

2.02 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded unions.
- B. Flanges for Pipe Size Over 1 Inch:
 - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.

2.03 BALL VALVES

- A. Manufacturers:
 - 1. Apollo Valves: www.apollovalves.com/#sle.
 - 2. Grinnell Products: www.grinnell.com/#sle.
 - 3. Milwaukee Valve Company: www.milwaukeevalve.com/#sle.
 - 4. Nibco, Inc: www.nibco.com/#sle.
 - 5. Viega LLC: www.viega.us/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, Teflon seats and stuffing box ring, blow-out proof stem, lever handle, solder or threaded ends.

2.04 PLUG VALVES

- A. Construction 2-1/2 Inches and Larger: MSS SP-78, 175 psi CWP, cast iron body and plug, pressure lubricated, Teflon or Buna N packing, flanged ends. Provide lever operator with set screw.

2.05 LINE PRESSURE REGULATORS AND APPLIANCE REGULATORS INDICATORS

- A. Manufacturers:

1. Actaris Metering Systems (A brand of ITT Controls): www.actaris-metering-systems.com/#sle.
 2. Dungs Combustion Controls: www.dungs.com/#sle.
 3. Maxitrol Company: www.maxitrol.com/#sle.
 4. Substitutions: See Section 016000 - Product Requirements.
- B. Compliance Requirements:
1. Appliance Regulator: ANSI Z21.18/CSA 6.3.
 2. Line Pressure Regulator: ANSI Z21.80/CSA 6.22.
- C. Materials in Contact With Gas:
1. Housing: Aluminum, steel (free of non-ferrous metals).
 2. Seals and Diaphragms: NBR-based rubber.
- D. Maximum Inlet Operating Pressure: 5 psi.
- E. Output Pressure Range: 1 inch wc to 80 inch wc.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

3.02 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- C. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 220516.
- F. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- I. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
1. Painting of exterior piping systems and components is specified in Section 099113.
- J. Install valves with stems upright or horizontal, not inverted.
- K. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.

3.04 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- C. Provide plug valves in natural gas systems for shut-off service.
- D. Contractor is responsible for coordination and paperwork with natural gas utility for meter installation.

END OF SECTION

**SECTION 232300
REFRIGERANT PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Filter-driers.

1.02 RELATED REQUIREMENTS

- A. Section 230719 - HVAC Piping Insulation.

1.03 REFERENCE STANDARDS

- A. AHRI 710 - Performance Rating of Liquid-Line Driers 2009.
- B. ASHRAE Std 15 - Safety Standard for Refrigeration Systems 2019, with All Amendments and Errata.
- C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- D. ASME B31.5 - Refrigeration Piping and Heat Transfer Components 2022.
- E. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service 2020.
- F. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store piping and specialties in shipping containers with labeling in place.
- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

- A. Products Requiring Electrical Connection: Listed and classified by UL, as suitable for the purpose indicated.

2.02 PIPING

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
 - 1. Fittings: ASME B16.22 wrought copper.
 - 2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.

2.03 MOISTURE AND LIQUID INDICATORS

- A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

2.04 FILTER-DRIERS

- A. Performance:
 - 1. Flow Capacity - Liquid Line: rated in accordance with AHRI 710.
 - 2. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
 - 3. Design Working Pressure: 350 psi, minimum.
- B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.
- C. Construction: UL listed.
 - 1. Connections: As specified for applicable pipe type.

PART 3 EXECUTION

3.01 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
 - 1. Provide copper plated hangers and supports for copper piping.
- F. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- G. Flood piping system with nitrogen when brazing.

- H. Insulate piping; refer to Section and Section 230716.
- I. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- J. Fully charge completed system with refrigerant after testing.

3.03 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Test refrigeration system in accordance with ASME B31.5.
- C. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch. Test to no leakage.

END OF SECTION

**SECTION 233100
HVAC DUCTS AND CASINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal ductwork.
- B. Nonmetal ductwork.

1.02 RELATED REQUIREMENTS

- A. Section 230713 - Duct Insulation: External insulation and duct liner.
- B. Section 233300 - Air Duct Accessories.
- C. Section 233600 - Air Terminal Units.
- D. Section 233700 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- D. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for duct materials.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 FIELD CONDITIONS

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. Low Pressure Supply: 2 inch wg pressure class, galvanized steel.
- D. Medium and High Pressure Supply: 3 inch w.g. pressure class, galvanized steel.
- E. Return and Relief: 2 inch wg pressure class, galvanized steel.
- F. General Exhaust: 2 inch wg pressure class, galvanized steel.
- G. Outside Air Intake: 1/2 inch wg pressure class, galvanized steel.
- H. Combustion Air: 1/2 inch wg pressure class, galvanized steel.
- I. Transfer Air and Sound Boots: 1 inch wg pressure class, fibrous glass.

2.02 MATERIALS

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
 - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
 - 2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
- C. Gasket Tape: Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle rings connections.

2.03 DUCTWORK FABRICATION

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.
- C. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- E. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.
- F. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- G. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).
- H. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

2.04 MANUFACTURED DUCTWORK AND FITTINGS

- A. Spiral Ducts: Round spiral lockseam duct with galvanized steel outer wall.
 - 1. Manufacture in accordance with SMACNA (DCS).
- B. Flexible Ducts: Two ply vinyl film supported by helically wound spring steel wire.
 - 1. Insulation: Fiberglass insulation with polyethylene vapor barrier film.
 - 2. Pressure Rating: 10 inches wg positive and 1.0 inches wg negative.
 - 3. Maximum Velocity: 4000 fpm.
 - 4. Temperature Range: Minus 10 degrees F to 160 degrees F.
- C. Round Duct Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Flexible Ducts: Connect to metal ducts with draw bands.
- E. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- G. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.
- H. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

END OF SECTION

**SECTION 233300
AIR DUCT ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Backdraft dampers - metal.
- B. Duct access doors.
- C. Duct test holes.
- D. Fire dampers.
- E. Flexible duct connectors.
- F. Volume control dampers.

1.02 RELATED REQUIREMENTS

- A. Section 230548 - Vibration and Seismic Controls for HVAC.
- B. Section 233100 - HVAC Ducts and Casings.

1.03 REFERENCE STANDARDS

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- C. UL 33 - Safety Heat Responsive Links for Fire-Protection Service Current Edition, Including All Revisions.
- D. UL 555 - Standard for Fire Dampers Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect dampers from damage to operating linkages and blades.

PART 2 PRODUCTS

2.01 BACKDRAFT DAMPERS - METAL

- A. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.

2.02 DUCT ACCESS DOORS

- A. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
 - 1. Less Than 12 inches Square: Secure with sash locks.
 - 2. Up to 18 inches Square: Provide two hinges and two sash locks.
 - 3. Up to 24 by 48 inches: Three hinges and two compression latches with outside and inside handles.
 - 4. Larger Sizes: Provide an additional hinge.
- B. Access doors with sheet metal screw fasteners are not acceptable.

2.03 DUCT TEST HOLES

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

2.04 FIRE DAMPERS

- A. Manufacturers:
 - 1. Nailor Industries, Inc: www.nailor.com/#sle.
 - 2. Pottorff: www.pottorff.com/#sle.
 - 3. Ruskin Company: www.ruskin.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- C. Curtain Type Dampers: Galvanized steel with interlocking blades. Provide stainless steel closure springs and latches for horizontal installations. Configure with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.
- D. Multiple Blade Dampers: 16 gauge, 0.0598 inch galvanized steel frame and blades, oil-impregnated bronze or stainless steel sleeve bearings and plated steel axles, 1/8 by 1/2 inch plated steel concealed linkage, stainless steel closure spring, blade stops, and lock.
- E. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

2.05 FLEXIBLE DUCT CONNECTORS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
 - 1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd.
 - a. Net Fabric Width: Approximately 2 inches wide.
 - 2. Metal: 3 inches wide, 24 gauge, 0.0239 inch thick galvanized steel.

2.06 VOLUME CONTROL DAMPERS

- A. Fabricate in accordance with SMACNA (DCS) and as indicated.
- B. Single Blade Dampers:
 - 1. Fabricate for duct sizes up to 6 by 30 inch.
 - 2. Blade: 24 gauge, 0.0239 inch, minimum.
- C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame

with suitable hardware.

1. Blade: 18 gauge, 0.0478 inch, minimum.
- D. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.
- E. Quadrants:
 1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
 2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
 3. Where rod lengths exceed 30 inches provide regulator at both ends.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 233100 for duct construction and pressure class.
- B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.
- D. Provide duct test holes where indicated and required for testing and balancing purposes.
- E. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
- F. Demonstrate re-setting of fire dampers to Owner's representative.
- G. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- H. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
 1. Refer to Section 230548.
- I. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

**SECTION 233423
HVAC POWER VENTILATORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof exhausters.
- B. Inline centrifugal fans.

1.02 RELATED REQUIREMENTS

- A. Section 230513 - Common Motor Requirements for HVAC Equipment.

1.03 REFERENCE STANDARDS

- A. AMCA 99 - Standards Handbook 2016.
- B. UL 705 - Power Ventilators Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.
- C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Fan Belts: One set for each individual fan.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 FIELD CONDITIONS

- A. Permanent ventilators may be used for ventilation during construction only after ductwork is clean, filters are in place, bearings have been lubricated, and fan has been test run under observation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Greenheck Fan Corporation: www.greenheck.com/#sle.
- B. Loren Cook Company: www.lorencook.com/#sle.
- C. PennBarry, Division of Air System Components: www.pennbarry.com/#sle.
- D. Twin City Fan & Blower: www.tcf.com/#sle.
- E. Substitutions: See Section 016000 - Product Requirements.

2.02 POWER VENTILATORS - GENERAL

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Comply with AMCA 99.
- E. UL Compliance: UL listed and labeled, designed, manufactured, and tested in accordance with UL 705.
- F. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

2.03 ROOF EXHAUSTERS

- A. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.
- B. Roof Curb: 16 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips.
- C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor.
- D. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.04 INLINE CENTRIFUGAL FANS

- A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.
- B. Disconnect Switch: Cord and plug in housing for thermal overload protected motor and wall mounted switch.
- C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.
- C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.
- D. Provide sheaves required for final air balance.

END OF SECTION

**SECTION 233516
ENGINE EXHAUST SYSTEMS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Centrifugal fans.
- B. Ductwork and duct accessories.
- C. Exhaust system accessories.

1.02 RELATED REQUIREMENTS

- A. Section 230513 - Common Motor Requirements for HVAC Equipment: Fan motors.
- B. Section 230913 - Instrumentation and Control Devices for HVAC: Carbon monoxide detectors.
- C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- B. AWS D9.1/D9.1M - Sheet Metal Welding Code 2018.
- C. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- D. SMACNA (RIDC) - Rectangular Industrial Duct Construction Standards 2007.
- E. SMACNA (ROUND) - Round Industrial Duct Construction Standards 2013.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturers literature and data sheets indicating rated capacities, dimensions, weights and point loadings, accessories, electrical characteristics and connection requirements, wiring diagrams, and location and sizes of field connections.
- C. Manufacturer's Installation Instructions: Include assembly and installation instructions.
- D. Operation and Maintenance Data: Include instructions for fan lubrication, motor and drive replacement, spare parts list, and wiring diagrams.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.

- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

- 1. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

1.07 FIELD CONDITIONS

- A. Permanent exhaust system may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Car-Mon Products Inc.
- B. Monoxivent.
- C. Fume-a-Vent..
- D. Substitutions: See Section 016000 - Product Requirements.

2.02 CENTRIFUGAL FANS

- A. Manufacturers:
 - 1. ACME Engineering and Manufacturing Corporation: www.acmefan.com/#sle.
 - 2. Loren Cook Company: www.lorencook.com/#sle.
 - 3. PennBarry, Division of Air System Components: www.pennbarry.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Base performance on sea level conditions.
- C. Wheel and Inlet: Steel construction with smooth curved inlet flange, heavy back plate, backwardly curved blades welded to flange and back plate; cast iron hub riveted to back plate and keyed to shaft with set screws.
- D. Housing: Heavy gauge steel, spot welded with inlet bell and shaped cut-off, factory finished with enamel or prime coat.
- E. Motors and Drives:
 - 1. Motors: As indicated, in compliance with Section 230513.
 - 2. Electrical Characteristics: See Section 260583.
 - 3. Bearings: Heavy duty pillow block type, self-aligning, grease-lubricated ball bearings or roller bearings.
 - 4. Shafts: Hot rolled steel, ground and polished, with key-way, protectively coated with lubricating oil.
 - 5. V-Belt Drive: Cast iron or steel sheaves, dynamically balanced, keyed, variable and adjustable pitch, matched belts, and rated minimum 1.5 times nameplate rating of motor.
 - 6. Belt Guard: Fabricate to SMACNA (DCS); of 12 gauge, 3/4 inch diamond mesh wire screen welded to steel angle frame or equivalent, prime coated.

2.03 DUCTWORK AND DUCT ACCESSORIES

- A. Materials:
 - 1. Galvanized Steel Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G90/Z275 coating.
- B. Ductwork:
 - 1. Fabricate and support in accordance with:
 - a. SMACNA (DCS).
 - b. SMACNA (RIDC) and SMACNA (ROUND).
 - 2. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline.
 - 3. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence

downstream.

4. Fabricate continuously welded round and oval duct fittings two gauges heavier than duct gauges indicated in SMACNA (ROUND).
 5. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow, with liquid adhesive plus sheet metal screws.
 6. Joints: Minimum 4 inch cemented slip type, brazed or electric welded to comply with AWS D9.1/D9.1M. Prime coat welded joints.
 7. Provide standard 45 degree lateral wye branch fittings unless otherwise indicated.
 8. Use double nuts and lock washers on threaded rod supports.
- C. Flexible Connectors: UL listed, fire-retardant polyethylene impregnated fabric, minimum density 20 oz per sq yd, approximately 6 inches wide, crimped into metal edging strip.
- D. Blast Gates: Half collar of cast aluminum, with galvanized steel slide.

2.04 EXHAUST SYSTEM ACCESSORIES

- A. Tail Pipe Adapters: Rubber formed to tapered cone with spring clip attachment, adapter size 6 inch, for connection to 6 inch diameter hose.
- B. Flexible Exhaust Hose: Heat resistant neoprene coated fabric spring steel wire reinforced, rated for duty to 260 degrees F and 20 inches WG positive or negative.
- C. Overhead Suspension System: System to support overhead hose consisting of 1/8 inch diameter braided steel cable, 2 inch diameter cadmium plated cast steel swivel pulleys, 6 inch cadmium plated cast steel cleats.
- D. Exhaust Hose Reel: Spring operated, manually controlled reel consisting of metal cylinder with internal aluminum flexible pipe, zinc plated steel stand, two steel springs, brake mechanism, hose stop, hose guide and 36 feet of 6 inch diameter hose.
- E. Floor Box: Single assembly of galvanized steel with cast aluminum floor flange and gate, for 2-1/2 inch hose.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install equipment in accordance with manufacturer's instructions.
- B. Install flexible connections at fan inlet and discharge. Ensure metal bands of connectors are parallel with minimum 1 inch flex between ductwork and fan while running.
- C. Provide pitot tube openings where required for testing of systems, complete with metal cap with spring device or screw to ensure against air leakage.
- D. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

END OF SECTION

**SECTION 233700
AIR OUTLETS AND INLETS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Diffusers:
 - 1. Rectangular ceiling diffusers.
- B. Registers/grilles:
 - 1. Exhaust and return register/grilles.
 - 2. Supply register/grilles.
 - 3. Wall-mounted, exhaust and return register/grilles.
- C. Louvers:
- D. Gravity ventilators.

1.02 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

- A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating 2012 (Reapproved 2015).
- B. AMCA 511 - Certified Ratings Program Product Rating Manual for Air Control Devices 2021.
- C. AMCA 550 - Test Method for High Velocity Wind Driven Rain Resistant Louvers 2022.
- D. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets 2006 (Reaffirmed 2021).
- E. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2021.
- F. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2021.
- G. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction

personnel on site.

- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Krueger-HVAC: www.krueger-hvac.com/#sle.
- B. Metalaire, a brand of Metal Industries Inc: www.metalair.com/#sle.
- C. Nailor.
- D. Price Industries: www.price-hvac.com/#sle.
- E. Titus, a brand of Air Distribution Technologies: www.titus-hvac.com/#sle.
- F. Substitutions: See Section 016000 - Product Requirements.

2.02 RECTANGULAR CEILING DIFFUSERS

- A. Type: Provide square, plaque diffuser to discharge air in 360 degree pattern.
- B. Connections: Round.
- C. Frame: Provide surface mount and inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.
- D. Fabrication: Steel with baked enamel finish.
- E. Color: As indicated.

2.03 EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, horizontal face.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting.
- C. Fabrication: Unless otherwise indicated, Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, with factory baked enamel finish.
- D. Color: As indicated.

2.04 SUPPLY REGISTERS/GRILLES

- A. Type: Streamlined and individually adjustable blades, 3/4 inch minimum depth, 3/4 inch maximum spacing with spring or other device to set blades, horizontal face, double deflection.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting and gasket.
- C. Fabrication: Unless otherwise indicated, Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades.
- D. Color: As indicated.

2.05 EXHAUST AND RETURN REGISTERS/GRILLES

- A. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with spring or other device to set blades, horizontal face.
- B. Frame: 1-1/4 inch margin with countersunk screw mounting.
- C. Fabrication: Steel and aluminum, as schedule with factory baked enamel finish.

- D. Color: To be selected by Architect from manufacturer's standard range.

2.06 LOUVERS

- A. Manufacturers:
 - 1. Greenheck.
 - 2. Ruskin Company: www.ruskin.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.
- B. Type: 6 inch deep frame with 35 to 45 degree drainable brades, heavy channel frame, 3/4 inch square mesh screen over rearface.
- C. Fabrication: Heavy gauge extruded 6063-T5 aluminum, 0.081 in. nominal thick frame and blades, welded assembly, with factory Kynar finish.
- D. Color: To be selected by Architect from manufacturer's full range.

2.07 GRAVITY VENTILATORS

- A. Spun Aluminum Intake Gravity Ventilator:
 - 1. Manufacturers:
 - a. American Coolair Corporation: www.coolair.com/#sle.
 - b. Greenheck Fan Corporation: www.greenheck.com/#sle.
 - c. Loren Cook Company: www.lorencook.com/#sle.
 - d. Substitutions: See Section 016000 - Product Requirements.
 - 2. General:
 - a. Provide low silhouette configuration for intake applications with natural gravity or negative pressure system.
 - b. Performance ratings and factory testing to be in accordance with AMCA 511 and AMCA 550.
 - c. Equipment to bear permanently affixed manufacturer's nameplate listing model and serial number.
 - 3. Hood:
 - a. Material: Aluminum.
 - 4. Birdscreen:
 - a. Fabricate in accordance with ASTM B221 (ASTM B221M).
 - b. Construction: 1/2 inch galvanized mesh.
 - c. Horizontally mounted across hood intake area.
 - 5. Housing:
 - a. Curb Cap:
 - 1) Construction: Aluminum.
 - 2) Integral deep spun inlet venturi with pre-punched mounting holes to ensure correct attachment to roof.
 - b. Windband:
 - 1) One piece spun aluminum construction with uniform, original material thickness throughout the housing.
 - 2) Include integral rolled bead for strength.
 - 6. Options/Accessories:
 - a. Roof Curbs:
 - 1) Flat Roofs:
 - (a) Welded, straight side curb with flashing flange and wood nailer.
 - b. Dampers:
 - 1) Type: Motorized.
 - 2) Balanced for minimal resistance to flow.
 - 3) Galvanized frames with pre-punched mounting holes.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.
- C. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- D. Install diffusers to ductwork with air tight connection.
- E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 099123.
- G. Provide bird screen on inside face of louver.

END OF SECTION

**SECTION 235100
BREECHINGS, CHIMNEYS, AND STACKS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Type B double wall gas vents.
- B. Double wall metal stacks.

1.02 REFERENCE STANDARDS

- A. NFPA 54 - National Fuel Gas Code 2021.
- B. NFPA 82 - Standard on Incinerators and Waste and Linen Handling Systems and Equipment 2019.
- C. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances 2019.
- D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- E. UL 103 - Factory-Built Chimneys for Residential Type and Building Heating Appliances Current Edition, Including All Revisions.
- F. UL 441 - Standard for Gas Vents Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 BREECHINGS, CHIMNEYS, AND STACKS - GENERAL REQUIREMENTS

- A. Regulatory Requirements:
 - 1. Comply with NFPA 54 for installation of natural gas burning appliances and equipment.

2.02 TYPE B DOUBLE WALL GAS VENTS

- A. Fabrication: Inner pipe of sheet aluminum, and outer pipe of galvanized sheet steel, tested in compliance with UL 441.

2.03 DOUBLE WALL METAL STACKS

- A. Manufacturers:
 - 1. Z-Flex U.S. Inc; Z-VENT Double Wall: www.z-flex.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.
- B. Provide double wall metal stacks, tested to UL 103 and UL listed with positive pressure rating, for use with building heating equipment, in compliance with NFPA 211.
- C. Fabricate with 1 inch minimum air space between walls and construct inner liner of 304 stainless steel and outer jacket of AL29-4C stainless steel.
 - 1. Protect aluminized steel surfaces exposed to the elements with a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for outer jacket skin temperatures of the application.
- D. Accessories, UL labeled:
 - 1. Ventilated Roof Thimble: Consists of roof penetration, vent flashing with spacers and storm collar.
 - 2. Stack Cap: Consists of conical rainshield with inverted cone for partial rain protection with low flow resistance.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 54
- C. Install breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.
- D. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA (DCS) for equivalent duct support configuration and size.
- E. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.
- F. For Type B double wall gas vents, maintain UL listed minimum clearances from combustibles. Assemble pipe and accessories as required for complete installation.
- G. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement. Connect base section to foundation using anchor lugs.
- H. Level and plumb chimney and stacks.
- I. Clean breechings, chimneys, and stacks during installation, removing dust and debris.

3.02 SCHEDULES

- A. Breechings, Chimneys and Stacks.
 - 1. Boiler: Double wall metal stacks.
 - 2. Duct Furnace: Type B double wall gas vents.
 - 3. Unit Heater: Type B double wall gas vents.

END OF SECTION

**SECTION 238126.13
SMALL-CAPACITY SPLIT-SYSTEM AIR CONDITIONERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air-source heat pumps.
- B. Air cooled condensing units.
- C. Indoor air handling (fan and coil) units for ductless systems.
- D. Controls.

1.02 RELATED REQUIREMENTS

- A. Section 230913 - Instrumentation and Control Devices for HVAC: Thermostats, humidistats, time clocks.
- B. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections and installation and wiring of thermostats and other controls components.

1.03 REFERENCE STANDARDS

- A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment 2023.
- B. AHRI 520 - Performance Rating of Positive Displacement Condensing Units 2004.
- C. ASHRAE Std 15 - Safety Standard for Refrigeration Systems 2019, with All Amendments and Errata.
- D. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant 2019.
- E. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- F. NFPA 90B - Standard for the Installation of Warm Air Heating and Air-Conditioning Systems 2021.
- G. UL 207 - Standard for Refrigerant-Containing Components and Accessories, Nonelectrical Current Edition, Including All Revisions.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide rated capacities, weights, accessories, electrical nameplate data, and wiring diagrams.
- C. Shop Drawings: Indicate assembly, required clearances, and location and size of field connections.
- D. Design Data: Indicate refrigerant pipe sizing.
- E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- F. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Filters: One for each unit.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the

project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Carrier Corporation: www.carrier.com/#sle.
- B. Daikin.
- C. Trane Inc: www.trane.com/#sle.
- D. York International Corporation / Johnson Controls: www.york.com/#sle.
- E. Substitutions: See Section 016000 - Product Requirements.

2.02 SYSTEM DESIGN

- A. Split-System Heating and Cooling Units: Self-contained, packaged, matched factory-engineered and assembled, pre-wired indoor and outdoor units; UL listed.
 1. Heating and Cooling: Air-source electric heat pump located in outdoor unit with evaporator; auxiliary electric heat.
 2. Provide refrigerant lines internal to units and between indoor and outdoor units, factory cleaned, dried, pressurized and sealed, with insulated suction line.
- B. Performance Requirements: See Drawings for additional requirements.
- C. Electrical Characteristics:
 1. Disconnect Switch: Factory mount disconnect switch on equipment under provisions of Section 260583.

2.03 INDOOR AIR HANDLING UNITS FOR DUCTLESS SYSTEMS

- A. Indoor Units: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, evaporator coil, and controls; wired for single power connection with control transformer.
 1. Location: High-wall.
 2. Cabinet: Smooth plastic.
 - a. Finish: White.
 3. Fan: Line-flow fan direct driven by a single motor.
- B. Evaporator Coils: Copper tube aluminum fin assembly, galvanized or polymer drain pan sloped in all directions to drain, drain connection, refrigerant piping connections, restricted distributor or thermostatic expansion valve.

1. Construction and Ratings: In accordance with AHRI 210/240 and UL 207.
2. Manufacturer: System manufacturer.

2.04 OUTDOOR UNITS

- A. Outdoor Units: Self-contained, packaged, pre-wired unit consisting of cabinet, with compressor and condenser.
 1. Refrigerant: R-410A.
 2. Cabinet: Galvanized steel with baked enamel finish, easily removed and secured access doors with safety interlock switches, glass fiber insulation with reflective liner.
 3. Construction and Ratings: In accordance with AHRI 210/240 with testing in accordance with ASHRAE Std 23.1 and UL 207.
- B. Compressor: Hermetic, two speed 1800 and 3600 rpm, AHRI 520 resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier. Provide time delay control to prevent short cycling and rapid speed changes.
- C. Air Cooled Condenser: Aluminum fin and copper tube coil, AHRI 520 with direct drive axial propeller fan resiliently mounted, galvanized fan guard.
 1. Condenser Fans: Direct-drive propeller type.
 2. Condenser Fan Motor: Enclosed, 1-phase type, permanently lubricated.
- D. Coil: Air-cooled, aluminum fins bonded to copper tubes.
- E. Accessories: Filter drier, high pressure switch (manual reset), low pressure switch (automatic reset), service valves and gauge ports, thermometer well (in liquid line).
 1. Provide thermostatic expansion valves.
 2. Provide heat pump reversing valves.
- F. Operating Controls:
 1. Control by room thermostat to maintain room temperature setting.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrates are ready for installation of units and openings are as indicated on shop drawings.
- B. Verify that proper power supply is available and in correct location.
- C. Verify that proper fuel supply is available for connection.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions and requirements of local authorities having jurisdiction.
- B. Install in accordance with NFPA 90A and NFPA 90B.
- C. Install refrigeration systems in accordance with ASHRAE Std 15.

END OF SECTION

**SECTION 238200
CONVECTION HEATING AND COOLING UNITS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electric unit heaters.
- B. Electric cabinet unit heaters.

1.02 RELATED REQUIREMENTS

1.03 REFERENCE STANDARDS

- A. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

1.04 SUBMITTALS

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 ELECTRIC UNIT HEATERS

- A. Manufacturers:
 - 1. INDEECO (Industrial Engineering and Equipment Company): www.indeeco.com/#sle.
 - 2. Markel Products Company.
 - 3. Marley Engineered Products.
 - 4. Modine Manufacturing Company: www.modineHVAC.com/#sle.
 - 5. Trane, a brand of Ingersoll Rand: www.trane.com/#sle.
 - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
- C. Assembly: Suitable for mounting from ceiling or structure above with built-in controls, thermal safety cut-out, and electric terminal box.

- D. Acceptable Heating Element Assemblies:
 - 1. Horizontal Projection Units:
 - a. Steel fins copper brazed to steel sheath and epoxy sealed for moisture resistance.
 - b. Nickel chromium resistance wire surrounded with magnesium oxide and sheathed in steel, spiral-finned tubes.
 - c. High-mass, all steel tubular type, copper brazed, centrally located and installed in fixed element banks.
- E. Housing:
 - 1. Horizontal Projection Units:
 - a. Construction materials to consist of heavy gauge steel with polyester powder coat or high gloss baked enamel finish.
 - b. Provide with threaded holes for threaded rod suspension.
 - c. Provisions for access to internal components for maintenance, adjustments, and repair.
- F. Air Inlets and Outlets:
 - 1. Inlets: Provide stamped louvers or protective grilles with fan blade guard.
 - 2. Outlets: Provide directional louvers.
- G. Fan: Factory balanced, direct drive, axial type with fan guard.
- H. Motor: Totally enclosed, thermally protected, and provided with permanently lubricated bearings.
- I. Controls:
 - 1. 24-volt relay.
 - 2. Terminal block for remote control.
- J. Electrical Characteristics:

2.02 ELECTRIC CABINET UNIT HEATERS

- A. Manufacturers:
 - 1. INDEECO (Industrial Engineering and Equipment Company): www.indeeco.com/#sle.
 - 2. Marley Engineered Products: www.marleymep.com/#sle.
 - 3. Trane, a brand of Ingersoll Rand: www.trane.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
- C. Heating Elements: Provide open-wire, finned tubular, or resistance wire enclosed in steel sheath.
- D. Cabinet: Minimum 18 gauge, 0.0478 inch thick steel front panel with exposed corners and edges rounded, easily removed panels, glass fiber insulation and integral air outlet, and inlet grilles.
- E. Finish:
 - 1. Factory applied, baked enamel finish.
 - 2. Color: As selected from color chart.
- F. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
- G. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are suitable for installation.
- B. Verify that field measurements are as indicated on drawings.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
- B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.
- C. Do not damage equipment or finishes.
- D. Unit Heaters:
 - 1. Hang from building structure, with pipe hangers anchored to building, not from piping or electrical conduit.
- E. Cabinet Unit Heaters:
 - 1. Install as indicated.
 - 2. Coordinate to ensure correct recess size for recessed units.
- F. Air Coils:
 - 1. Install in ducts and casings in accordance with SMACNA (DCS).
 - a. Support coil sections independent of piping on steel channel or double angle frames and secure to casing.
 - 2. Coil Safeguards:
 - a. Protect coils to prevent damage to flanges and fins.
 - b. Comb out damaged fins.
 - 3. Make connections to hydronic coils with unions and flanges.

3.03 CLEANING

- A. After construction and painting is completed, clean exposed surfaces of units.
- B. Vacuum clean coils and inside of units.
- C. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.
- D. Install new filters.

3.04 PROTECTION

- A. Provide finished cabinet units with protective covers during the balance of construction.

SECTION 260519
LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 262100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conductors.
- E. Section 284600 - Fire Detection and Alarm: Fire alarm system conductors and cables.

1.02 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.
- F. FS A-A-59544 - Cable and Wire, Electrical (Power, Fixed Installation) 2008a (Validated 2019).
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. NFPA 79 - Electrical Standard for Industrial Machinery 2021.
- K. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- L. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- M. UL 267 - Outline of Investigation for Wire-Pulling Compounds Current Edition, Including All Revisions.
- N. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
- O. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- P. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.
- Q. UL 2277 - Outline of Investigation for Flexible Motor Supply Cable and Wind Turbine Tray Cable Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.

3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Sustainable Design Documentation: Submit manufacturer's product data on conductor and cable showing compliance with specified lead content requirements.
- D. Manufactured Wiring System Shop Drawings: Provide plan views indicating proposed system layout with components identified; indicate branch circuit connections.
- E. Wire Pulling Lubricant: Certification of compatibility with conductors/cables where used with the following insulation/jacket types:
 1. Low-smoke zero halogen (LSZH).
 2. Low-density polyethylene (LDPE).
 3. Semiconducting.
- F. Design Data: Indicate voltage drop and ampacity calculations for aluminum conductors substituted for copper conductors. Include proposed modifications to raceways, boxes, wiring gutters, enclosures, etc. to accommodate substituted conductors.
- G. Field Quality Control Test Reports.
- H. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- I. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.
- J. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 1. See Section 016000 - Product Requirements, for additional provisions.
 2. Extra Manufactured Wiring Systems Cable Assemblies: One of each configuration, 6 feet length.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

1.08 FIELD CONDITIONS

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect and obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
 1. Exceptions:
 - a. Use variable-frequency drive cable for connection between variable-frequency motor controllers and associated motors.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Underground feeder and branch-circuit cable is not permitted.
- E. Service entrance cable is not permitted.
- F. Armored cable is not permitted.
- G. Metal-clad cable is not permitted.
- H. Manufactured wiring systems are permitted only as follows:

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Comply with FS A-A-59544 where applicable.
- F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- H. Conductors for Grounding and Bonding: Also comply with Section 260526.
- I. Conductors and Cables Installed Where Exposed to Direct Rays of Sun: Listed and labeled as sunlight resistant.

- J. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- K. Conductor Material:
 - 1. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
 - 2. Tinned Copper Conductors: Comply with ASTM B33.
- L. Conductor Color Coding:
 - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
 - 2. Color Coding Method: Integrally colored insulation.
 - 3. Color Code:
 - a. 480Y/277 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - 4) Neutral/Grounded: Gray.
 - b. 208Y/120 V, 3 Phase, 4 Wire System:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 - 4) Neutral/Grounded: White.
 - c. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Conductor Stranding:
 - 1. Feeders and Branch Circuits:
 - a. Size 10 AWG and Smaller: Solid.
 - b. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation:
 - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

2.04 VARIABLE-FREQUENCY DRIVE CABLE

- A. Description: Flexible motor supply cable listed and labeled as complying with UL 2277 in accordance with NFPA 79; specifically designed for use with variable frequency drives and associated nonlinear power distortions.
- B. Conductor Stranding: Stranded.
- C. Insulation Voltage Rating: 1000 V.
- D. Insulation: Use only thermoset insulation types; thermoplastic insulation types are not permitted.
- E. Grounding: Full-size integral equipment grounding conductor or symmetrical arrangement of multiple conductors of equivalent size.
- F. Provide metallic shielding.
- G. Jacket: PVC or Chlorinated Polyethylene (CPE).

2.05 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

2.06 ACCESSORIES

- A. Electrical Tape:
 - 1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
- B. Wire Pulling Lubricant:
 - 1. Listed and labeled as complying with UL 267.
 - 2. Suitable for use with conductors/cables and associated insulation/jackets to be installed.
 - 3. Suitable for use at installation temperature.
- C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Circuiting Requirements:
 - 1. Unless dimensioned, circuit routing indicated is diagrammatic.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Installation in Raceway:
 - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
 - 2. Pull all conductors and cables together into raceway at same time.
 - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
 - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- E. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- F. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- G. Terminate cables using suitable fittings,
- H. Variable-Frequency Drive Cable: Terminate shielding at both variable-frequency motor controller and associated motor using glands or termination kits recommended by manufacturer.
- I. Install conductors with a minimum of 12 inches of slack at each outlet.
- J. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- K. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- L. Make wiring connections using specified wiring connectors.
 - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
 - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
 - 3. Do not remove conductor strands to facilitate insertion into connector.
 - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

- M. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
- N. Insulate ends of spare conductors using vinyl insulating electrical tape.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- P. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

SECTION 260526
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 260536 - Cable Trays for Electrical Systems: Additional grounding and bonding requirements for cable tray systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 265600 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings 2022.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding Electrode System:
 - 1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
 - a. Provide continuous grounding electrode conductors without splice or joint.
 - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
 - 2. Ground Rod Electrode(s):
 - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
 - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
 - c. Where location is not indicated, locate electrode(s) at least 5 feet outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.
 - 3. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
 - a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - 4. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.
- E. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
 2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
 3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
 4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
 5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
 6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
 7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
 - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
- F. Communications Systems Grounding and Bonding:
1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
 2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
 - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
 - b. Minimum Raceway Size: 3/4 inch trade size unless otherwise indicated or required.
 - c. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.
 - d. Ground Bar Mounting Height: 18 inches above finished floor unless otherwise indicated.
- G. Cable Tray Systems: Also comply with Section 260536.
- H. Pole-Mounted Luminaires: Also comply with Section 265600.

2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
 2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
1. Use insulated copper conductors unless otherwise indicated.
 - a. Exceptions:
 - 1) Use bare copper conductors where installed underground in direct contact with earth.
 - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
 2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
 3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
1. Description: Copper rectangular ground bars with mounting brackets and insulators.
 2. Size: As indicated.

3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
 1. Comply with NEMA GR 1.
 2. Material: Copper-bonded (copper-clad) steel.
 3. Size: 3/4 inch diameter by 10 feet length, unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
- D. Make grounding and bonding connections using specified connectors.
 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 260553.

END OF SECTION

**SECTION 260529
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 260533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- C. Section 260536 - Cable Trays for Electrical Systems: Additional support and attachment requirements for cable tray.
- D. Section 260533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- E. Section 265100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- F. Section 265600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.
- G. Section 270529 - Hangers and Supports for Communications Systems.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
 - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 033000.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. NFPA 70.
 - b. Requirements of authorities having jurisdiction.

2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of electrical work.
 3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of 2.5. Include consideration for vibration, equipment operation, and shock loads where applicable.
 5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 6. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps and clamps suitable for conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- D. Metal Channel/Strut Framing Systems:
1. Description: Factory-fabricated, continuous-slot, painted metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 2. Comply with MFMA-4.
- E. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.
 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
 4. Preset Concrete Inserts: Continuous metal channel/strut and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Manufacturer: Same as manufacturer of metal channel/strut framing system.
 - b. Comply with MFMA-4.
 - c. Channel Material: Use galvanized steel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
 2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- I. Secure fasteners in accordance with manufacturer's recommended torque settings.
- J. Remove temporary supports.

END OF SECTION

**SECTION 260533.13
CONDUIT FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260533.16 - Boxes for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 262100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.

1.02 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- E. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
- F. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.
- G. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.
- J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- L. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- M. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
- N. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- P. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- Q. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with actual type and quantity of conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
 - 2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment, and other potential conflicts.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
 - 4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:

1. Do not begin installation of conductors and cables until installation of conduit between termination points is complete.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, manufacturer's instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 1. Under Slab on Grade: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), rigid PVC conduit, or reinforced thermosetting resin conduit (RTRC).
 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or rigid PVC conduit.
- D. Embedded Within Concrete:
 1. Within Slab on Grade: Not permitted.
 2. Within Slab Above Ground: Not permitted.
 3. Within Concrete Walls Above Ground: Use galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC).
 4. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit (RMC) or stainless steel rigid metal conduit (RMC) where emerging from concrete.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit (RMC) or galvanized steel intermediate metal conduit (IMC).
- F. Interior Enclosed Rooms, Interior Enclosed Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or stainless steel electrical metallic tubing (EMT).
- G. Exposed, Dry Interior Enclosed Rooms, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), or galvanized steel electrical metallic tubing (EMT).
- H. Exposed Raceways, Undercover, Within the Parking Structure Enclosure: Schedule 80 HWPVC.
- I. Exposed, Exterior, Not Subject to Severe Physical Damage: Use galvanized steel rigid metal conduit (RMC).
- J. Flexible Connections to Vibrating Equipment:
 1. Dry Locations: Use flexible metal conduit (FMC).
 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit (LFMC).
 3. Maximum Length: 6 feet unless otherwise indicated.

2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70.
- B. Provide conduit, fittings, supports, and accessories required for complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for purpose intended.
- D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:

1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.04 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use threaded type fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.

2.05 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- B. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.

2.07 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 2. Material: Use steel or malleable iron.
 3. Connectors and Couplings: Use compression/gland or set-screw type.
 - a. Do not use indenter type connectors and couplings.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 840 unless otherwise indicated; rated for use with conductors rated 90 degrees C.
- B. Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.09 REINFORCED THERMOSETTING RESIN CONDUIT (RTRC)

- A. Description: NFPA 70, Type RTRC reinforced thermosetting resin conduit complying with NEMA TC 14 (SERIES).
- B. Supports: As recommended by manufacturer.

- C. Fittings: Same type and manufacturer as conduit to be connected.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in accordance with NECA 1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- F. Conduit Support:
 - 1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction; see Section 260529.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- G. Connections and Terminations:
 - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 - 3. Use suitable adapters where required to transition from one type of conduit to another.
 - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 - 6. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect conductors.
 - 7. Secure joints and connections to provide mechanical strength and electrical continuity.
- H. Penetrations:
 - 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 - 2. Make penetrations perpendicular to surfaces unless otherwise indicated.
 - 3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
 - 4. Conceal bends for conduit risers emerging above ground.
 - 5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 - 6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
 - 7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.
- I. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
 - 1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 - 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 - 3. Where conduits are subject to earth movement by settlement or frost.
- J. Conduit Sealing:
 - 1. Use foam conduit sealant to prevent entry of moisture and gases. This includes, but is not limited to:

- a. Where conduits enter building from outside.
 - b. Where service conduits enter building from underground distribution system.
 - c. Where conduits enter building from underground.
 - d. Where conduits may transport moisture to contact live parts.
- 2. Where conduits cross barriers between areas of potential substantial temperature differential, use foam conduit sealant at accessible point near penetration to prevent condensation. This includes, but is not limited to:
 - a. Where conduits pass from outdoors into conditioned interior spaces.
 - b. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- K. Provide grounding and bonding; see Section 260526.

END OF SECTION

**SECTION 260533.16
BOXES FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.13 - Conduit for Electrical Systems:
 - 1. Conduit bodies and other fittings.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 262726 - Wiring Devices:
 - 1. Wall plates.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- E. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013 (Reaffirmed 2020).
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- I. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
 - 4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
 - 5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
 - 6. Coordinate the work with other trades to preserve insulation integrity.
 - 7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
 - 8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

PART 2 PRODUCTS

2.01 BOXES

- A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
 2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
 3. Provide products listed, classified, and labeled as suitable for the purpose intended.
 4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
 5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
 2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
 3. Use suitable concrete type boxes where flush-mounted in concrete.
 4. Use suitable masonry type boxes where flush-mounted in masonry walls.
 5. Use raised covers suitable for the type of wall construction and device configuration where required.
 6. Use shallow boxes where required by the type of wall construction.
 7. Do not use "through-wall" boxes designed for access from both sides of wall.
 8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
 9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
 10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
 11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
 12. Wall Plates: Comply with Section 262726.
 13. Use non-metallic junction boxes where Schedule 80 HWPVC raceways are allowed.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
 2. NEMA 250 Environment Type, Unless Otherwise Indicated:
 3. Junction and Pull Boxes Larger Than 100 cubic inches:
 - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Box Supports:
 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in

accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

- G. Install boxes plumb and level.
- H. Flush-Mounted Boxes:
 - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
 - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
 - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- I. Install boxes as required to preserve insulation integrity.
- J. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- K. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- L. Close unused box openings.
- M. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- N. Provide grounding and bonding in accordance with Section 260526.

END OF SECTION

**SECTION 260536
CABLE TRAYS FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
- D. Section 260529 - Hangers and Supports for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

1.02 REFERENCE STANDARDS

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2022.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NEMA VE 1 - Metal Cable Tray Systems 2017.
- D. NEMA VE 2 - Cable Tray Installation Guidelines 2018.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the arrangement of cable tray with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others. Coordinate the work with other trades to avoid installation of obstructions within cable tray required clearances.
 - 2. Coordinate arrangement of cable tray with the dimensions and clearance requirements of the actual products to be installed.
 - 3. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 4. Notify of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Preinstallation Meeting: Convene one week prior to commencing work of this section; require attendance of all affected installers. Review proposed routing, sequence of installation, and protection requirements for installed cable tray.
- C. Sequencing:
 - 1. Do not begin installation of cables until installation of associated cable tray run is complete.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cable tray system components and accessories. Include dimensions, materials, fabrication details, finishes, and span/load ratings.
- C. Shop Drawings: Include dimensioned plan views and sections indicating proposed cable tray routing, required clearances, and locations and details of supports, fittings, building element penetrations, and equipment connections.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the

project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 CABLE TRAY SYSTEM - GENERAL REQUIREMENTS

- A. Provide new cable tray system consisting of all required components, fittings, supports, accessories, etc. as necessary for a complete system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use cable tray for applications other than as permitted by NFPA 70 and product listing/classification.
- D. Provide cable tray system and associated components suitable for use at indicated span/load ratings under the service conditions at the installed location.
- E. Unless otherwise indicated, specified span/load ratings are based on safety factor of 1.5 and working load only (no additional concentrated static load), with ratings for metal cable tray systems in accordance with NEMA VE 1.
- F. Unless otherwise indicated, specified load/fill depths and inside widths are nominal values, with values for metal cable tray systems in accordance with NEMA VE 1 including applicable allowable tolerances.

2.02 METAL CABLE TRAY SYSTEMS

- A. Comply with NEMA VE 1.
- B. Finishes:
 1. Mill-Galvanized Before Fabrication (Pre-Galvanized) Steel: Comply with ASTM A653/A653M, G90 coating.
- C. Metal Ladder Cable Tray:
 1. Material: Mill-galvanized before fabrication (pre-galvanized) steel.
 2. Load/Fill Depth: As indicated on drawings.
 3. Span/Load Rating: As indicated on drawings.
 4. Rung Spacing: 9 inches on center for straight lengths.
 5. Inside Width: As indicated on drawings.
 6. Inside Radius of Fittings: 12 inches.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install cable tray in accordance with NECA 1 (general workmanship), and NEMA VE 2.

- C. Unless otherwise indicated, arrange cable tray to be parallel or perpendicular to building lines.
- D. Arrange cable tray to provide required clearances and maintain cable access.
- E. Install cable tray plumb and level, with sections aligned and with horizontal runs at the proper elevation.
- F. Cable Tray Movement Provisions:
 - 1. Provide suitable expansion fittings where cable tray is subject to movement, including but not limited to:
 - a. Where cable tray crosses structural joints intended for expansion.
 - b. Long straight cable tray runs in accordance with NEMA VE 2.
 - 2. Use expansion guides in lieu of hold-down clamps where prescribed in NEMA VE 2.
 - 3. Set gaps for expansion fittings in accordance with NEMA VE 2.
- G. Cable Provisions:
 - 1. Use suitable fixed barrier strips to maintain separation of cables as indicated and as required by NFPA 70.
 - 2. Use suitable drop-out fittings or bushings where cables exit cable tray as required to maintain minimum cable bending radius.
 - 3. Use suitable cable support fittings for long vertical cable tray runs with heavy cables.
- H. Provide end closures at unconnected ends of cable tray runs.
- I. Cable Tray Support:
 - 1. Use manufacturer's recommended hangers and supports, located in accordance with NEMA VE 2 and manufacturer's requirements, but not exceeding specified span unless otherwise approved by Engineer. Provide required support and attachment in accordance with Section 260529, where not furnished by cable tray manufacturer.
 - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- J. Grounding and Bonding Requirements, in Addition to Requirements of Section 260526:
 - 1. Comply with grounding and bonding requirements of NEMA VE 2.
 - 2. Metal Cable Tray Systems: Use suitable bonding jumpers or classified connectors to provide electrical continuity.
 - 3. Provide suitable equipment grounding conductor in each cable tray, except where cable tray contains only multiconductor cables with integral equipment grounding conductors. Do not use metal cable tray system as sole equipment grounding conductor.
- K. Penetrations: Install firestopping to preserve fire resistance rating of building elements, using materials and methods specified in Section 078400.
- L. Identification Requirements, in Addition to Those Specified in Section 260553.

END OF SECTION

SECTION 260553
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 2 PRODUCTS

1.01 IDENTIFICATION REQUIREMENTS

- A. Identification for Equipment:
 - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
 - a. Switchboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use identification nameplate to identify main overcurrent protective device.
 - 5) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - b. Panelboards:
 - 1) Identify ampere rating.
 - 2) Identify voltage and phase.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - 4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
 - 5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
 - c. Transformers:
 - 1) Identify kVA rating.
 - 2) Identify voltage and phase for primary and secondary.
 - 3) Identify power source and circuit number. Include location when not within sight of equipment.
 - d. Enclosed switches, circuit breakers, and motor controllers:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number. Include location when not within sight of equipment.
 - e. Transfer Switches:
 - 1) Identify voltage and phase.
 - 2) Identify power source and circuit number for both normal power source and standby power source. Include location when not within sight of equipment.
 - 3) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.
 - 2. Service Equipment:
 - a. Use identification nameplate to identify each service disconnecting means.
 - 3. Emergency System Equipment:
 - a. Use identification nameplate or voltage marker to identify emergency system equipment in accordance with NFPA 70.
 - b. Use identification nameplate at each piece of service equipment to identify type and location of on-site emergency power sources.
 - 4. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
 - a. Service equipment.
 - b. Elevator control panels.
 - 5. Arc Flash Hazard Warning Labels: Comply with Section 260573.
- B. Identification for Conductors and Cables:

1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
- C. Identification for Cable Tray: Comply with Section 260536.
- D. Identification for Boxes:
1. Use voltage markers or color coded boxes to identify systems other than normal power system.
 - a. Color-Coded Boxes: Field-painted in accordance with Section 099123 and 099113 per the same color code used for raceways.
 - 1) Emergency Power System: Red.
 - 2) Fire Alarm System: Red.
 2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.
- E. Identification for Devices:
1. Identification for Communications Devices: Comply with Section 271000.
 2. Wiring Device and Wallplate Finishes: Comply with Section 262726.

1.02 IDENTIFICATION NAMEPLATES AND LABELS

- A. Identification Nameplates:
1. Materials:
 - a. Indoor Clean, Dry Locations: Use plastic nameplates.
 - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
 2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
 3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
 4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
 5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
 2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

1.03 VOLTAGE MARKERS

- A. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- B. Minimum Size:
1. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches.
 2. Markers for Junction Boxes: 1/2 by 2 1/4 inches.
- C. Legend:
1. Markers for System Identification:
 - a. Emergency Power System: Text "EMERGENCY".
- D. Color: Black text on orange background unless otherwise indicated.

1.04 WARNING SIGNS AND LABELS

- A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- B. Warning Signs:
1. Materials:

2. Minimum Size: 7 by 10 inches unless otherwise indicated.
- C. Warning Labels:
 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

2.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
 1. Surface-Mounted Equipment: Enclosure front.
 2. Flush-Mounted Equipment: Inside of equipment door.
 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
 4. Elevated Equipment: Legible from the floor or working platform.
 5. Branch Devices: Adjacent to device.
 6. Interior Components: Legible from the point of access.
 7. Boxes: Outside face of cover.
 8. Conductors and Cables: Legible from the point of access.
 9. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

**SECTION 260573
POWER SYSTEM STUDIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Short-circuit study.
- B. Protective device coordination study.
- C. Arc flash and shock risk assessment.
 - 1. Includes arc flash hazard warning labels.
- D. Criteria for the selection and adjustment of equipment and associated protective devices not specified in this section, as determined by studies to be performed.

1.02 RELATED REQUIREMENTS

- A. Section 260553 - Identification for Electrical Systems: Additional requirements for arc flash hazard warning labels.
- B. Section 262100 - Low-Voltage Electrical Service Entrance.
 - 1. Includes Utility Company contact information.
- C. Section 262413 - Switchboards.
- D. Section 262416 - Panelboards.
- E. Section 262813 - Fuses.
- F. Section 262816.13 - Enclosed Circuit Breakers.
- G. Section 262816.16 - Enclosed Switches.

1.03 REFERENCE STANDARDS

- A. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011 (Reaffirmed 2017).
- B. IEEE 242 - IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems 2001, with Errata (2003).
- C. IEEE 399 - IEEE Recommended Practice for Industrial and Commercial Power Systems Analysis 1997.
- D. IEEE 551 - IEEE Recommended Practice for Calculating Short-Circuit Currents in Industrial and Commercial Power Systems 2006.
- E. IEEE 1584 - IEEE Guide for Performing Arc-Flash Hazard Calculations 2018, with Errata (2019).
- F. NEMA MG 1 - Motors and Generators 2021.
- G. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. NFPA 70E - Standard for Electrical Safety in the Workplace 2021.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work to provide equipment and associated protective devices complying with criteria for selection and adjustment, as determined by studies to be performed.
 - 2. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Submit study reports prior to or concurrent with product submittals.

2. Do not order equipment until matching study reports and product submittals have both been evaluated by Architect.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Study reports, stamped or sealed and signed by study preparer.
- C. Arc Flash Hazard Warning Label Samples: One of each type and legend specified.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
 1. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 2. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 POWER SYSTEM STUDIES

- A. Scope of Studies:
 1. Except where study descriptions below indicate exclusions, analyze system at each bus from primary protective devices of utility source down to each piece of equipment involved, including parts of system affecting calculations being performed (e.g. fault current contribution from motors).
 2. Include in analysis alternate sources and operating modes (including known future configurations) to determine worst case conditions.
 3. Study shall be prepared and issued by an engineer licensed to practice in Wisconsin. The engineer shall be hired by the project electrical contractor but shall not be an employee of the electrical contractor.
- B. General Study Requirements:
 1. Comply with NFPA 70.
 2. Perform studies utilizing computer software complying with specified requirements; manual calculations are not permitted.
- C. Data Collection:
 1. Compile information on project-specific characteristics of actual installed equipment, protective devices, feeders, etc. as necessary to develop single-line diagram of electrical distribution system and associated input data for use in system modeling.
 - a. Utility Source Data: Include primary voltage, maximum and minimum three-phase and line-to-ground fault currents, impedance, X/R ratio, and primary protective device

- information.
- 1) Obtain up-to-date information from Utility Company.
- 2) Utility Company: See Section 262100 for Utility Company contact information.
- b. Generators: Include manufacturer/model, kW and voltage ratings, and impedance.
- c. Motors: Include manufacturer/model, type (e.g. induction, synchronous), horsepower rating, voltage rating, full load amps, and locked rotor current or NEMA MG 1 code letter designation.
- d. Transformers: Include primary and secondary voltage ratings, kVA rating, winding configuration, percent impedance, and X/R ratio.
- e. Protective Devices:
 - 1) Circuit Breakers: Include manufacturer/model, type (e.g. thermal magnetic, electronic trip), frame size, trip rating, voltage rating, interrupting rating, available field-adjustable trip response settings, and features (e.g. zone selective interlocking).
 - 2) Fuses: Include manufacturer/model, type/class (e.g. Class J), size/rating, and speed (e.g. time delay, fast acting).
- f. Conductors: Include feeder size, material (e.g. copper, aluminum), insulation type, voltage rating, number per phase, raceway type, and actual length.
- D. Short-Circuit Study:
 - 1. Comply with IEEE 551 and applicable portions of IEEE 141, IEEE 242, and IEEE 399.
 - 2. For purposes of determining equipment short circuit current ratings, consider conditions that may result in maximum available fault current, including but not limited to:
 - a. Maximum utility fault currents.
 - b. Maximum motor contribution.
 - c. Known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
 - 3. For each bus location, calculate the maximum available three-phase bolted symmetrical and asymmetrical fault currents. For grounded systems, also calculate the maximum available line-to-ground bolted fault currents.
- E. Protective Device Coordination Study:
 - 1. Comply with applicable portions of IEEE 242 and IEEE 399.
 - 2. Analyze alternate scenarios considering known operating modes (e.g. utility as source, generator as source, utility/generator in parallel, bus tie breaker open/close positions).
 - 3. Analyze protective devices and associated settings for suitable margins between time-current curves to provide adequate protection for equipment and conductors while achieving full selective coordination.
- F. Arc Flash and Shock Risk Assessment:
 - 1. Comply with NFPA 70E.
 - 2. Perform incident energy and arc flash boundary calculations in accordance with IEEE 1584 (as referenced in NFPA 70E Annex D), where applicable.
 - 3. Analyze alternate scenarios considering conditions that may result in maximum incident energy, including but not limited to:
 - a. Maximum and minimum utility fault currents.
 - b. Maximum and minimum motor contribution.
 - c. Known operating modes (e.g. utility as source, generator as source).
- G. Study Reports:
 - 1. General Requirements:
 - a. Identify date of study and study preparer.
 - b. Identify study methodology and software product(s) used.
 - c. Identify scope of studies, assumptions made, implications of possible alternate scenarios, and any exclusions from studies.
 - d. Identify base used for per unit values.
 - e. Include single-line diagram and associated input data used for studies; identify buses on single-line diagram as referenced in reports, and indicate bus voltage.

- f. Include conclusions and recommendations.
- 2. Short-Circuit Study:
 - a. For each scenario, identify at each bus location:
 - 1) Calculated maximum available symmetrical and asymmetrical fault currents (both three-phase and line-to-ground where applicable).
 - 2) Fault point X/R ratio.
 - 3) Associated equipment short circuit current ratings.
 - b. Identify locations where the available fault current exceeds the equipment short circuit current rating, along with recommendations.
- 3. Protective Device Coordination Study:
 - a. For each scenario, include time-current coordination curves plotted on log-log scale graphs.
 - b. For each graph include (where applicable):
 - 1) Partial single-line diagram identifying the portion of the system illustrated.
 - 2) Protective Devices: Time-current curves with applicable tolerance bands for each protective device in series back to the source, plotted up to the maximum available fault current at the associated bus.
 - 3) Conductors: Damage curves.
 - 4) Transformers: Inrush points and damage curves.
 - 5) Generators: Full load current, overload curves, decrement curves, and short circuit withstand points.
 - 6) Motors: Full load current, starting curves, and damage curves.
 - c. For each protective device, identify fixed and adjustable characteristics with available ranges and recommended settings.
 - 1) Circuit Breakers: Include long time pickup and delay, short time pickup and delay, and instantaneous pickup.
 - 2) Include ground fault pickup and delay.
 - 3) Include fuse ratings.
 - d. Identify cases where either full selective coordination or adequate protection is not achieved, along with recommendations.
- 4. Arc Flash and Shock Risk Assessment:
 - a. For the worst case for each scenario, identify at each bus location:
 - 1) Calculated incident energy and associated working distance.
 - 2) Calculated arc flash boundary.
 - 3) Bolted fault current.
 - 4) Arcing fault current.
 - 5) Clearing time.
 - 6) Arc gap distance.
 - b. For purposes of producing arc flash hazard warning labels, summarize the maximum incident energy and associated data reflecting the worst case condition of all scenarios at each bus location.

1.08 QUALITY ASSURANCE

- A. Study Preparer Qualifications: Professional electrical engineer licensed in the State in which the Project is located and with minimum five years experience in preparation of studies of similar type and complexity using specified computer software.
- B. Computer Software for Study Preparation: Use the latest edition of commercially available software utilizing specified methodologies.

PART 2 PRODUCTS

2.01 ARC FLASH HAZARD WARNING LABELS

- A. Provide warning labels complying with ANSI Z535.4 to identify arc flash hazards for each work location analyzed by the arc flash and shock risk assessment.
 - 1. Materials: Comply with Section 260553.

2. Legend: Provide custom legend in accordance with NFPA 70E based on equipment-specific data as determined by arc flash and shock risk assessment.
 - a. Include the following information:
 - 1) Arc flash boundary.
 - 2) Available incident energy and corresponding working distance.
 - 3) Nominal system voltage.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Adjust equipment and protective devices for compliance with studies and recommended settings.
- D. Notify Architect of any conflicts with or deviations from studies. Obtain direction before proceeding.

END OF SECTION

**SECTION 260923
LIGHTING CONTROL DEVICES**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems
- C. Section 260533.16 - Boxes for Electrical Systems.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 260573 - Power System Studies.
- F. Section 262726 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.
- G. Section 265100 - Interior Lighting.
- H. Section 265600 - Exterior Lighting.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.

1.03 ADMINISTRATIVE REQUIREMENTS

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
 - 2. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.

- b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

- A. All Occupancy Sensors:
 - 1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
 - 2. Sensor Technology:
 - a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
 - 3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
 - 4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
 - 5. Turn-Off Delay: Field adjustable.
 - 6. Integral Photocell: For field selectable and adjustable inhibition of automatic turn-on of load when ambient lighting is above the selected level.
 - 7. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
- B. Wall Switch Occupancy Sensors:
 - 1. All Wall Switch Occupancy Sensors:
 - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
 - b. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
- C. Luminaire Mounted Occupancy Sensors: Designed for direct luminaire installation and control, suitable for use with specified luminaires.

2.03 DAYLIGHTING CONTROLS

- A. System Description: Control system consisting of photo sensors and compatible control modules and power packs, contactors, or relays as required for automatic control of load indicated according to available natural light; capable of integrating with occupancy sensors and manual override controls.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of lighting control devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:

- a. Wall Switch Occupancy Sensors: 48 inches above finished floor.
- 2. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 262726.
- G. Provide required supports in accordance with Section 260529.
- H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

3.02 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.
- C. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by Architect.

END OF SECTION

**SECTION 262100
LOW-VOLTAGE ELECTRICAL SERVICE ENTRANCE**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electrical service requirements.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Materials and installation requirements for cast-in-place concrete equipment pads.
- B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
- D. Section 260529 - Hangers and Supports for Electrical Systems.
- E. Section 260533.13 - Conduit for Electrical Systems.
- F. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 262416 - Panelboards: Service entrance equipment.
- H. Section 262713 - Electricity Metering: Non-utility electrical metering.
- I. Section 262816.16 - Enclosed Switches: Service entrance equipment.
- J. Section 263213 - Engine Generators: Emergency/standby power systems for interconnection with normal utility electrical supply.
- K. Section 263600 - Transfer Switches: Service entrance equipment.
- L. Section 264300 - Surge Protective Devices: Service entrance surge protective devices.

1.03 DEFINITIONS

- A. Service Point: The point of connection between the facilities of the serving utility and the premises wiring as defined in NFPA 70, and as designated by the Utility Company.

1.04 REFERENCE STANDARDS

- A. IEEE C2 - National Electrical Safety Code(R) (NESC(R)) 2023.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.05 ADMINISTRATIVE REQUIREMENTS

- A. No later than two weeks following date of the Agreement, notify Utility Company of anticipated date of service.
- B. Coordination:
 - 1. Verify the following with Utility Company representative:
 - a. Utility Company requirements, including division of responsibility.
 - b. Exact location and details of utility point of connection.
 - c. Utility easement requirements.
 - d. Utility Company charges associated with providing service.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for electrical service and associated equipment.
 - 3. Coordinate arrangement of service entrance equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- C. Arrange for Utility Company to provide permanent electrical service. Prepare and submit documentation required by Utility Company.
- D. Utility Company charges associated with providing permanent service to be paid by Owner.

- E. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Utility Company representative.
- F. Scheduling:
 - 1. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.06 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Utility Company letter of availability for providing electrical service to project.
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product. Include ratings, configurations, standard wiring diagrams, outline and support point dimensions, finishes, weights, service condition requirements, and installed features.
- D. Shop Drawings: Include dimensioned plan views and sections indicating locations and arrangement of Utility Company and service entrance equipment, metering provisions, required clearances, and proposed service routing.
 - 1. Obtain Utility company approval of shop drawings prior to submittal.
- E. Project Record Documents: Record actual locations of equipment and installed service routing.

1.07 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.08 QUALITY ASSURANCE

- A. Comply with the following:
 - 1. IEEE C2 (National Electrical Safety Code).
 - 2. NFPA 70 (National Electrical Code).
 - 3. The requirements of the Utility Company.

1.09 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.
- B. Store products indoors in a clean, dry space having a uniform temperature to prevent condensation (including outdoor rated products which are not weatherproof until completely and properly installed). Maintain factory wrapping or provide an additional heavy canvas or

heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

- C. Handle products carefully to avoid damage to internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 ELECTRICAL SERVICE REQUIREMENTS

- A. Provide new electrical service consisting of all required conduits, conductors, equipment, metering provisions, supports, accessories, etc. as necessary for connection between Utility Company point of supply and service entrance equipment.
- B. Electrical Service Characteristics: As indicated on drawings.
- C. Utility Company: MG&E.
 - 1. Point of Contact: Brian Bigge.
 - 2. Address: PO Box 1231 Madison, WI 53701.
 - 3. Phone: 608-252-7338 or 605-350-4746.
 - 4. Email: bbigge@mge.com.
- D. Division of Responsibility:
 - 1. Pad-Mounted Utility Transformers:
 - a. Transformers: Furnished and installed by Utility Company.
 - b. Transformer Grounding Provisions: Furnished and installed by Contractor per Utility Company requirements.
 - c. Primary:
 - 1) Trenching and Backfilling: Provided by Contractor.
 - 2) Conduits: Furnished and installed by Contractor.
 - 3) Conductors: Furnished and installed by Utility Company.
 - d. Secondary:
 - 1) Trenching and Backfilling: Provided by Contractor.
 - 2) Conduits: Furnished and installed by Contractor.
 - 3) Conductors: Furnished and installed by Contractor (Service Point at transformer).
 - 2. Terminations at Service Point: Provided by Utility Company.
 - 3. Metering Provisions:
 - a. Meter Bases: Furnished and installed by Contractor per Utility Company requirements.
 - b. Metering Transformer Cabinets: Furnished and installed by Contractor per Utility Company requirements.
- E. Products Furnished by Contractor: Comply with Utility Company requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that ratings and configurations of service entrance equipment are consistent with the indicated requirements.
- C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

3.03 INSTALLATION

- A. Install products in accordance with manufacturer's instructions and Utility Company requirements.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Construct cast-in-place concrete pads for utility equipment in accordance with Utility Company requirements and Section 033000.
- E. Provide required support and attachment components in accordance with Section 260529.

- F. Provide grounding and bonding for service entrance equipment in accordance with Section 260526.
- G. Identify service entrance equipment, including main service disconnect(s) in accordance with Section 260553.

END OF SECTION

**SECTION 262200
LOW-VOLTAGE TRANSFORMERS**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.13 - Conduit for Electrical Systems: Flexible conduit connections.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 262416 - Panelboards.

1.02 REFERENCE STANDARDS

- A. 10 CFR 431, Subpart K - Energy Efficiency Program for Certain Commercial and Industrial Equipment - Distribution Transformers Current Edition.
- B. IEEE C57.96 - IEEE Standard Guide for Loading Dry-Type Distribution and Power Transformers 2013.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 409 - Standard for Installing and Maintaining Dry-Type Transformers 2015.
- E. NEMA ST 20 - Dry Type Transformers for General Applications 2021.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 506 - Standard for Specialty Transformers Current Edition, Including All Revisions.
- I. UL 1561 - Standard for Dry-Type General Purpose and Power Transformers Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.
 - 1. Vibration Isolators: Include attachment method and rated load and deflection.
 - 2. K-factor Rated Transformers: Include K-factor ratings.
 - 3. Buck-boost Transformers: Include voltage selection tables and wiring diagrams for autotransformer configurations.
 - 4. Shielded Transformers: Include shielding method and noise attenuation performance.
- C. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - 2. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - a. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted,

- harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
- b. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 TRANSFORMERS - GENERAL REQUIREMENTS

- A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.
- B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:
 - 1. Altitude: Less than 3,300 feet.
 - 2. Ambient Temperature:
 - a. Greater than 10 kVA: Not exceeding 104 degrees F.
 - b. Less than 10 kVA: Not exceeding 77 degrees F.
- C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.
- D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.
- E. Basic Impulse Level: 10 kV.
- F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.
- G. Isolate core and coil from enclosure using vibration-absorbing mounts.
- H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.02 GENERAL PURPOSE TRANSFORMERS

- A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.
- B. Insulation System and Allowable Average Winding Temperature Rise:
 - 1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.
 - 2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.
- C. Coil Conductors: Continuous aluminum windings with terminations brazed or welded.
- D. Winding Taps:
 - 1. Less than 3 kVA: None.
 - 2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.
 - 3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.

4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.
- E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.
- F. Sound Levels: Standard sound levels complying with NEMA ST 20
- G. Mounting Provisions:
 1. Less than 15 kVA: Suitable for wall mounting.
 2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.
 3. Larger than 75 kVA: Suitable for floor mounting.
- H. Transformer Enclosure: Comply with NEMA ST 20.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 2. Construction: Steel.
 - a. Less than 15 kVA: Totally enclosed, non-ventilated.
 - b. 15 kVA and Larger: Ventilated.
 3. Finish: Manufacturer's standard grey, suitable for outdoor installations.
 4. Provide lifting eyes or brackets.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install transformers in accordance with NECA 409 and IEEE C57.94.
- D. Use flexible conduit, under the provisions of Section 260533.13, 2 feet minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.
- F. Install transformers plumb and level.
- G. Transformer Support:
 1. Provide required support and attachment in accordance with Section 260529, where not furnished by transformer manufacturer.
 2. Use integral transformer flanges, accessory brackets furnished by manufacturer, or field-fabricated supports to support wall-mounted transformers.
 3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.
 4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- H. Provide grounding and bonding in accordance with Section 260526.
- I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.
- J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.

3.02 CLEANING

- A. Clean dirt and debris from transformer components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 262413 SWITCHBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Low-voltage (600 V and less) switchboards and associated accessories for service and distribution applications.
- B. Overcurrent protective devices for switchboards.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 260573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.
- F. Section 262100 - Low-Voltage Electrical Service Entrance.
 - 1. Includes Utility Company contact information.
- G. Section 262713 - Electricity Metering: For interface with equipment specified in this section.
- H. Section 264300 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers 2016.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 400 - Standard for Installing and Maintaining Switchboards 2007.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- F. NEMA PB 2 - Deadfront Distribution Switchboards 2011.
- G. NEMA PB 2.1 - General Instructions for Proper Handling, Installation, Operation, and Maintenance of Deadfront Distribution Switchboards Rated 600 Volts or Less 2013.
- H. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- J. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- K. UL 869A - Reference Standard for Service Equipment Current Edition, Including All Revisions.
- L. UL 891 - Switchboards Current Edition, Including All Revisions.
- M. UL 1053 - Ground-Fault Sensing and Relaying Equipment Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 4. Coordinate with manufacturer to provide shipping splits suitable for the dimensional constraints of the installation.
 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Service Entrance Switchboards:
1. Coordinate with Utility Company to provide switchboards with suitable provisions for electrical service and utility metering, where applicable.
 2. Coordinate with Owner to arrange for Utility Company required access to equipment for installation and maintenance.
 3. See Section 262100 for Utility Company contact information and additional requirements.
 4. Obtain Utility Company approval of switchboard prior to fabrication.
 5. Arrange for inspections necessary to obtain Utility Company approval of installation.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for switchboards, enclosures, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate dimensions, voltage, bus ampacities, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. Enclosure Keys: Two of each different key.
 2. Electronic Trip Circuit Breakers: Provide one portable test set.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 2. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - a. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.

- b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Comply with requirements of NFPA 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Switchboards:
 - 1. ABB/GEE.
 - 2. Eaton Corporation.
 - 3. Schneider Electric.
 - 4. Siemens Industry, Inc.
- B. Source Limitations: Furnish switchboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 SWITCHBOARDS

- A. Provide switchboards consisting of all required components, control power transformers, instrumentation and control wiring, accessories, etc. as necessary for a complete operating system.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Description: Dead-front switchboard assemblies complying with NEMA PB 2, and listed and labeled as complying with UL 891; ratings, configurations and features as indicated on the drawings.
- D. Service Entrance Switchboards:
 - 1. Listed and labeled as suitable for use as service equipment according to UL 869A.
 - 2. For solidly-grounded wye systems, provide factory-installed main bonding jumper between neutral and ground busses, and removable neutral disconnecting link for testing purposes.
 - 3. Comply with Utility Company requirements for electrical service.
- E. Service Conditions:
 - 1. Provide switchboards and associated components suitable for operation under the following service conditions without derating:
 - a. Altitude: Less than 6,600 feet.
 - b. Ambient Temperature:
 - 1) Switchboards Containing Molded Case or Insulated Case Circuit Breakers: Between 23 degrees F and 104 degrees F.
 - 2. Provide switchboards and associated components suitable for operation at indicated ratings under the service conditions at the installed location.
- F. Short Circuit Current Rating:
 - 1. Provide switchboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
- G. Main Devices: Configure for top or bottom incoming feed as indicated or as required for the installation. Provide separate pull section and/or top-mounted pullbox as indicated or as required to facilitate installation of incoming feed.
- H. Bussing: Sized in accordance with UL 891 temperature rise requirements.
 - 1. Through bus (horizontal cross bus) to be fully rated through full length of switchboard (non-tapered). Tapered bus is not permitted.
 - 2. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
 - 3. Provide solidly bonded equipment ground bus through full length of switchboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
 - 4. Phase and Neutral Bus Material: Copper.

- 5. Ground Bus Material: Copper.
- I. Conductor Terminations: Suitable for use with the conductors to be installed.
 - 1. Line Conductor Terminations:
 - a. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
 - b. Main and Neutral Lug Type: Mechanical.
 - 2. Load Conductor Terminations:
 - a. Lug Material: Copper, suitable for terminating copper conductors only.
 - b. Lug Type:
- J. Enclosures:
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1 or Type 2 (drip-proof).
 - 2. Finish: Manufacturer's standard unless otherwise indicated.
- K. Future Provisions:
 - 1. Prepare designated spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- L. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
 - 1. Where overcurrent protective devices equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.
- M. Owner Metering: Comply with Section 262713.
- N. Instrument Transformers:
 - 1. Comply with IEEE C57.13.
 - 2. Select suitable ratio, burden, and accuracy as required for connected devices.
 - 3. Current Transformers: Connect secondaries to shorting terminal blocks.
 - 4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

2.03 OVERCURRENT PROTECTIVE DEVICES

- A. Circuit Breakers:
 - 1. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than specified minimum requirements.
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 2. Molded Case Circuit Breakers:
 - a. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers; listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - b. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - 1) Provide the following field-adjustable trip response settings:
 - (a) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - (b) Long time delay.
 - (c) Short time pickup and delay.
 - (d) Instantaneous pickup.
 - (e) Ground fault pickup and delay where ground fault protection is indicated.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.

- B. Verify that the ratings and configurations of the switchboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive switchboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install switchboards in accordance with NECA 1 (general workmanship), NECA 400, and NEMA PB 2.1.
- C. Arrange equipment to provide required clearances and maintenance access.
- D. Where switchboard is indicated to be mounted with inaccessible side against wall, provide minimum clearance of 1/2 inch between switchboard and wall.
- E. Provide required support and attachment in accordance with Section 260529.
- F. Install switchboards plumb and level.
- G. Unless otherwise indicated, mount switchboards on properly sized 4 inch high concrete pad constructed in accordance with Section 033000.
- H. Provide grounding and bonding in accordance with Section 260526.
- I. Install all field-installed devices, components, and accessories.
- J. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- K. Set field-adjustable circuit breaker tripping function settings as determined by overcurrent protective device coordination study performed in accordance with Section 260573.
- L. Set field-adjustable ground fault protection pickup and time delay settings as indicated.
- M. Provide filler plates to cover unused spaces in switchboards.

3.03 FIELD QUALITY CONTROL

- A. Before energizing switchboard, perform insulation resistance testing in accordance with NECA 400 and NEMA PB 2.1.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.1.
- D. Molded Case and Insulated Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers. Tests listed as optional are not required.
- E. Ground Fault Protection Systems: Test in accordance with manufacturer's instructions as required by NFPA 70.
 - 1. Perform inspections and tests listed in NETA ATS, Section 7.14. The insulation-resistance test on control wiring listed as optional is not required.
- F. Instrument Transformers: Perform inspections and tests listed in NETA ATS, Section 7.10. The dielectric withstand tests on primary windings with secondary windings connected to ground listed as optional are not required.
- G. Correct deficiencies and replace damaged or defective switchboards or associated components.

3.04 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of switchboard covers and doors.

3.05 CLEANING

- A. Clean dirt and debris from switchboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred surfaces to match original factory finish.

END OF SECTION

SECTION 262416 PANELBOARDS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 260573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.
- E. Section 264300 - Surge Protective Devices.

1.02 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- E. NEMA PB 1 - Panelboards 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- J. UL 67 - Panelboards Current Edition, Including All Revisions.
- K. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- L. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
 - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
 - 1. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature:
 - a. Panelboards Containing Circuit Breakers: Between 23 degrees F and 104 degrees F.
- C. Short Circuit Current Rating:
 - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
- D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- F. Bussing: Sized in accordance with UL 67 temperature rise requirements.

1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- G. Conductor Terminations: Suitable for use with the conductors to be installed.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 2. Boxes: Galvanized steel unless otherwise indicated.
 - a. Provide wiring gutters sized to accommodate the conductors to be installed.
 3. Fronts:
 - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
 - b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.
- J. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 264300, list and label panelboards as a complete assembly including surge protective device.

2.03 POWER DISTRIBUTION PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 1. Phase and Neutral Bus Material: Aluminum or copper.
 2. Ground Bus Material: Copper.
- D. Circuit Breakers:
 1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.
 2. Provide electronic trip circuit breakers where indicated.
- E. Enclosures:
 1. Provide surface-mounted enclosures unless otherwise indicated.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
 1. Main and Neutral Lug Material: Copper, suitable for terminating copper conductors only.
 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
 2. Phase and Neutral Bus Material: Aluminum or copper.
 3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
 1. Provide surface-mounted or flush-mounted enclosures as indicated.
 2. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
 - 1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
 - 2. Interrupting Capacity:
 - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
 - 3. Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
 - 5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
 - a. Provide the following field-adjustable trip response settings:
 - 1) Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - 2) Long time delay.
 - 3) Short time pickup and delay.
 - 4) Instantaneous pickup.
 - 5) Ground fault pickup and delay where ground fault protection is indicated.
 - 6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
 - 7. Provide the following circuit breaker types where indicated:
 - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
 - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
 - c. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
 - 8. Do not use tandem circuit breakers.
 - 9. Do not use handle ties in lieu of multi-pole circuit breakers.
 - 10. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
 - 11. Provide the following features and accessories where indicated or where required to complete installation:
 - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
 - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 260529.
- F. Install panelboards plumb.
- G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches above the floor or working platform.
- I. Provide minimum of two spare 1 inch trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.
- J. Provide grounding and bonding in accordance with Section 260526.
- K. Install all field-installed branch devices, components, and accessories.
- L. Provide filler plates to cover unused spaces in panelboards.

3.02 ADJUSTING

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

3.03 CLEANING

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

**SECTION 262713
ELECTRICITY METERING**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.16 - Boxes for Electrical Systems: Cabinets and enclosures for metering system components.
- D. Section 262813 - Fuses.

1.02 REFERENCE STANDARDS

- A. IEEE C57.13 - IEEE Standard Requirements for Instrument Transformers 2016.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

PART 2 PRODUCTS

2.01 EQUIPMENT FOR OWNER ELECTRICITY METERING

- A. Provide microprocessor-based digital electricity metering systems including all instrument transformers, wiring, and connections necessary for measurements specified.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide electricity metering systems and associated components compatible with the equipment and associated circuits to be metered.
- D. Service Conditions: Provide electricity meters suitable for operation under the service conditions at the installed location.
- E. Enclosures:
 - 1. Where not furnished by manufacturer, provide required cabinets and enclosures in accordance with Section 260533.16.
 - 2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 3. Finish: Manufacturer's standard unless otherwise indicated.
- F. Instrument Transformers:
 - 1. Comply with IEEE C57.13, where applicable.
 - 2. Select suitable ratio, burden, and accuracy as required for connected devices.
 - 3. Current Transformers: Compatible with connected meters; replace meters damaged by connection of incompatible current transformers. Provide shorting terminal blocks for connection of secondaries where applicable.
 - 4. Potential Transformers: Include primary and secondary fuses with disconnecting means.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Provide required support and attachment components in accordance with Section 260529.
- D. Provide grounding and bonding in accordance with Section 260526.
- E. Provide fuses complying with Section 262813 as required.

END OF SECTION

SECTION 262726 WIRING DEVICES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260533.16 - Boxes for Electrical Systems.
- D. Section 260583 - Wiring Connections: Cords and plugs for equipment.
- E. Section 260923 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.

1.02 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification) 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- G. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.
- H. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- J. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
 - 3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Wall Plates: One of each style, size, and finish.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals

- a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
- 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet of sinks.

2.02 WIRING DEVICE FINISHES

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices Installed in Unfinished Spaces: Gray with stainless steel wall plate.

2.03 WALL SWITCHES

- A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.04 RECEPTACLES

- A. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
 - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
 - 2. NEMA configurations specified are according to NEMA WD 6.
- B. Convenience Receptacles:
 - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
 - 2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations; single or duplex as

indicated on the drawings.

- C. GFCI Receptacles:
 - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
 - a. Provide test and reset buttons of same color as device.
 - 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
 - 3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SD suitable for installation in damp or wet locations.

2.05 WALL PLATES

- A. Wall Plates: Comply with UL 514D.
 - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
 - 2. Size: Standard.
 - 3. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- C. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- D. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
 - 1. Mounting Heights: Unless otherwise indicated, as follows:
 - a. Wall Switches: 48 inches above finished floor.
 - b. Receptacles: 18 inches above finished floor or 6 inches above counter.
 - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
 - 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
 - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.
- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

END OF SECTION

SECTION 262813 FUSES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- B. Section 260573 - Power System Studies: Additional criteria for the selection of protective devices specified in this section.

1.02 REFERENCE STANDARDS

- A. NEMA FU 1 - Low Voltage Cartridge Fuses 2012.
- B. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.
- B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Fuses: One set(s) of three for each type and size installed.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 FUSES

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.

- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

END OF SECTION

**SECTION 262816.13
ENCLOSED CIRCUIT BREAKERS**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 260573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

1.02 REFERENCE STANDARDS

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- G. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.
- H. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.
- I. UL 1053 - Ground-Fault Sensing and Relaying Equipment Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for circuit breakers, enclosures, and other installed components and accessories.
- C. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements.

Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 ENCLOSED CIRCUIT BREAKERS

- A. Description: Units consisting of molded case circuit breakers individually mounted in enclosures.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 1. Altitude: Less than 6,600 feet.
 2. Ambient Temperature: Between 23 degrees F and 104 degrees F.
- D. Short Circuit Current Rating:
- E. Conductor Terminations: Suitable for use with the conductors to be installed.
- F. Provide electronic trip circuit breakers _____ unless otherwise indicated.
- G. Provide solidly bonded equipment ground bus in each enclosed circuit breaker, with a suitable lug for terminating each equipment grounding conductor.
- H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 2. Provide surface-mounted enclosures unless otherwise indicated.
- I. Provide externally operable handle with means for locking in the OFF position.
- J. Ground Fault Protection: Where ground-fault protection is indicated, provide system listed and labeled as complying with UL 1053.
 1. Where electronic circuit breakers equipped with integral ground fault protection are used, provide separate neutral current sensor where applicable.

2.02 MOLDED CASE CIRCUIT BREAKERS

- A. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
- B. Interrupting Capacity:

1. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
 2. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
- C. Conductor Terminations:
1. Lug Material: Copper, suitable for terminating copper conductors only.
- D. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.
1. Provide the following field-adjustable trip response settings:
 - a. Long time pickup, adjustable by replacing interchangeable trip unit or by setting dial.
 - b. Long time delay.
 - c. Short time pickup and delay.
 - d. Instantaneous pickup.
 - e. Ground fault pickup and delay where ground fault protection is indicated.
- E. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
- F. Provide the following circuit breaker types where indicated:
1. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install enclosed circuit breakers plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed circuit breakers such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 260526.
- H. Set field-adjustable ground fault protection pickup and time delay settings as indicated.

END OF SECTION

**SECTION 262816.16
ENCLOSED SWITCHES**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 260573 - Power System Studies: Additional criteria for the selection of equipment and associated protective devices specified in this section.
- E. Section 262813 - Fuses.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NEMA KS 1 - Heavy Duty Enclosed and Dead-Front Switches (600 Volts Maximum) 2013.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- G. UL 98 - Enclosed and Dead-Front Switches Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.
 - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - 2. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.

- a. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - b. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 ENCLOSED SAFETY SWITCHES

- A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
 - 1. Altitude: Less than 6,600 feet.
 - 2. Ambient Temperature: Between -22 degrees F and 104 degrees F.
- D. Horsepower Rating: Suitable for connected load.
- E. Voltage Rating: Suitable for circuit voltage.
- F. Short Circuit Current Rating:
 - 1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
- G. Provide with switch blade contact position that is visible when the cover is open.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.
- J. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - a. Indoor Clean, Dry Locations: Type 1.
 - b. Outdoor Locations: Type 3R.
- K. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.
- L. Heavy Duty Switches:
 - 1. Comply with NEMA KS 1.
 - 2. Conductor Terminations:
 - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
 - 3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 260526.

END OF SECTION

**SECTION 263213
ENGINE GENERATORS**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 235100 - Breechings, Chimneys, and Stacks: Engine exhaust piping.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
- D. Section 260529 - Hangers and Supports for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- F. Section 263600 - Transfer Switches.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA/EGSA 404 - Standard for Installing Generator Sets 2014.
- C. NEMA MG 1 - Motors and Generators 2021.
- D. NFPA 110 - Standard for Emergency and Standby Power Systems 2022.
- E. UL 1236 - Battery Chargers for Charging Engine-Starter Batteries Current Edition, Including All Revisions.
- F. UL 2200 - Stationary Engine Generator Assemblies Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of generator sets to be installed with work provided under other sections or by others.
 - a. Transfer Switches: See Section 263600.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment or other potential obstructions within the spaces dedicated for engine generator system.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work to provide electrical circuits suitable for the power requirements of the actual auxiliary equipment and accessories to be installed.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features. Include alternator starting capabilities, engine fuel consumption rates, and cooling, combustion air, and exhaust requirements.
 - 1. Include generator set sound level test data.
- C. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
- D. Manufacturer's factory emissions certification.
- E. Manufacturer's certification that products meet or exceed specified requirements.
- F. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

1. Include contact information for entity that will be providing contract maintenance and trouble call-back service.

G. Alternate Bid Maintenance contracts.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
1. Project Goals
 2. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 3. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 4. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Packaged Engine Generator Set - Basis of Design: Kohler Co; 250REZXB.
- B. Packaged Engine Generator Set - Other Acceptable Manufacturers:
1. Caterpillar Inc.
 2. Cummins Power Generation Inc.
 3. Generac Power Systems.
- C. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

2.02 PACKAGED ENGINE GENERATOR SYSTEM

- A. Provide new engine generator system consisting of all required equipment, sensors, conduit, boxes, wiring, piping, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. System Description:
1. Application: Emergency/standby.
 2. Configuration: Single packaged engine generator set operated independently (not in parallel).
- D. Packaged Engine Generator Set:
1. Type: Gaseous (spark ignition).
 2. Power Rating: 250 kW, standby.
 3. Voltage: As indicated on drawings.

4. Main Line Circuit Breaker:
 - a. Type: Thermal magnetic.
 - b. Trip Rating: Select according to generator set rating.
- E. Generator Set General Requirements:
 1. Prototype tested in accordance with NFPA 110 for Level 1 systems.
 2. Factory-assembled, with components mounted on suitable base.
 3. List and label engine generator assembly as complying with UL 2200.
 4. Power Factor: Unless otherwise indicated, specified power ratings are at 0.8 power factor for three phase voltages and 1.0 power factor for single phase voltages.
 5. Provide suitable guards to protect personnel from accidental contact with rotating parts, hot piping, and other potential sources of injury.
 6. Main Line Circuit Breakers: Provide factory-installed line side connections with suitable lugs for load side connections.
- F. Service Conditions: Provide engine generator system and associated components suitable for operation under the service conditions at the installed location.
- G. Starting and Load Acceptance Requirements:
 1. Cranking Method: Cycle cranking complying with NFPA 110 (15 second crank period, followed by 15 second rest period, with cranking limiter time-out after 3 cycles), unless otherwise required.
 2. Cranking Limiter Time-Out: If generator set fails to start after specified cranking period, indicate overcrank alarm condition and lock-out generator set from further cranking until manually reset.
 3. Start Time: Capable of starting and achieving conditions necessary for load acceptance within 10 seconds (NFPA 110, Type 10).
 4. Maximum Load Step: Supports 100 percent of rated load in one step.
 - a. Maximum Voltage Deviation with Load Step: 30 percent.
 - b. Maximum Frequency Deviation with Load Step: 10 percent.
 5. Motor Starting Capability: Supports starting of motor load indicated with a maximum voltage dip of 30 percent.
- H. Exhaust Emissions Requirements:
 1. Comply with federal (EPA), state, and local regulations applicable at the time of commissioning; include factory emissions certification with submittals.
 2. Do not make modifications affecting generator set factory emissions certification without approval of manufacturer and Engineer. Where such modifications are made, provide field emissions testing as necessary for certification.

2.03 ENGINE AND ENGINE ACCESSORY EQUIPMENT

- A. Provide engine with adequate horsepower to achieve specified power output at rated speed, accounting for alternator efficiency and parasitic loads.
- B. Engine Fuel System - Gaseous (Spark Ignition):
 1. Fuel Source: Natural gas.
 2. Engine Fuel Connections: Provide suitable, approved flexible fuel lines for coupling engine to fuel source.
 3. Provide components/features indicated and as necessary for operation and/or required by applicable codes, including but not limited to:
 - a. Carburetor.
 - b. Gas pressure regulators.
 - c. Fuel shutoff control valves.
 - d. Low gas pressure switches.
- C. Engine Starting System:
 1. System Type: Electric, with DC solenoid-activated starting motor(s).
 2. Battery(s):
 - a. Battery Type: Lead-acid.

- b. Battery Capacity: Size according to manufacturer's recommendations for achieving starting and load acceptance requirements under worst case ambient temperature; capable of providing cranking through two complete periods of cranking limiter time-outs without recharging.
 - c. Provide battery rack, cables, and connectors suitable for the supplied battery(s); size battery cables according to manufacturer's recommendations for cable length to be installed.
 - 3. Battery-Charging Alternator: Engine-driven, with integral solid-state voltage regulation.
 - 4. Battery Charger:
 - a. Provide dual rate battery charger with automatic float and equalize charging modes and minimum rating of 10 amps; suitable for maintaining the supplied battery(s) at full charge without manual intervention.
 - b. Capable of returning supplied battery(s) from fully discharged to fully charged condition within 24 hours, as required by NFPA 110 for Level 1 applications while carrying normal loads.
 - c. Recognized as complying with UL 1236.
 - d. Furnished with integral overcurrent protection; current limited to protect charger during engine cranking; reverse polarity protection.
 - e. Provide integral DC output ammeter and voltmeter with five percent accuracy.
 - f. Provide alarm output contacts as necessary for alarm indications.
 - 5. Battery Heater: Provide thermostatically controlled battery heater to improve starting under cold ambient conditions.
- D. Engine Speed Control System (Governor):
 - 1. Single Engine Generator Sets (Not Operated in Parallel): Provide electronic isochronous governor for controlling engine speed/alternator frequency.
 - 2. Frequency Regulation, Electronic Isochronous Governors: No change in frequency from no load to full load; plus/minus 0.25 percent at steady state.
- E. Engine Lubrication System:
 - 1. System Type: Full pressure, with engine-driven, positive displacement lubrication oil pump, replaceable full-flow oil filter(s), and dip-stick for oil level indication. Provide oil cooler where recommended by manufacturer.
- F. Engine Cooling System:
 - 1. System Type: Closed-loop, liquid-cooled, with unit-mounted radiator/fan and engine-driven coolant pump; suitable for providing adequate cooling while operating at full load under worst case ambient temperature.
 - 2. Fan Guard: Provide suitable guard to protect personnel from accidental contact with fan.
- G. Engine Air Intake and Exhaust System:
 - 1. Air Intake Filtration: Provide engine-mounted, replaceable, dry element filter.
 - 2. Engine Exhaust Connection: Provide suitable, approved flexible connector for coupling engine to exhaust system.

2.04 ALTERNATOR (GENERATOR)

- A. Alternator: 4-pole, 1800 rpm (60 Hz output) revolving field, synchronous generator complying with NEMA MG 1; connected to engine with flexible coupling; voltage output configuration as indicated, with reconnectable leads for 3 phase alternators.
- B. Exciter:
 - 1. Exciter Type: Brushless; provide permanent magnet generator (PMG) excitation system; self-excited (shunt) systems are not permitted.
 - 2. PMG Excitation Short-Circuit Current Support: Capable of sustaining 300 percent of rated output current for 10 seconds.
 - 3. Voltage Regulation (with PMG excitation): Plus/minus 0.5 percent for any constant load from no load to full load.
- C. Temperature Rise: Comply with UL 2200.
- D. Insulation System: NEMA MG 1, Class H; suitable for alternator temperature rise.

- E. Enclosure: NEMA MG 1, drip-proof.
- F. Total Harmonic Distortion: Not greater than five percent.

2.05 GENERATOR SET CONTROL SYSTEM

- A. Provide microprocessor-based control system for automatic control, monitoring, and protection of generator set. Include sensors, wiring, and connections necessary for functions/indications specified.
- B. Control Panel:
 - 1. Control Panel Mounting: Unit-mounted unless otherwise indicated; vibration isolated.
 - 2. Generator Set Control Functions:
 - a. Automatic Mode: Initiates generator set start/shutdown upon receiving corresponding signal from remote device (e.g. automatic transfer switch).
 - b. Manual Mode: Initiates generator set start/shutdown upon direction from operator.
 - c. Reset Mode: Clears all faults, allowing generator set restart after a shutdown.
 - d. Emergency Stop: Immediately shuts down generator set (without time delay) and prevents automatic restarting until manually reset.
 - e. Cycle Cranking: Programmable crank time, rest time, and number of cycles.
 - f. Time Delay: Programmable for shutdown (engine cooldown) and start (engine warmup).
 - g. Voltage Adjustment: Adjustable through range of plus/minus 5 percent.
 - 3. Generator Set Status Indications:
 - a. Voltage (Volts AC): Line-to-line, line-to-neutral for each phase.
 - b. Current (Amps): For each phase.
 - c. Frequency (Hz).
 - d. Real power (W/kW).
 - e. Reactive power (VAR/kVAR).
 - f. Apparent power (VA/kVA).
 - g. Power factor.
 - h. Duty Level: Actual load as percentage of rated power.
 - i. Engine speed (RPM).
 - j. Battery voltage (Volts DC).
 - k. Engine oil pressure.
 - l. Engine coolant temperature.
 - m. Engine run time.
 - n. Generator powering load (position signal from transfer switch).
 - 4. Generator Set Protection and Warning/Shutdown Indications:
 - a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following protections/indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).
 - 11) Low cranking voltage (warning).
 - 12) Low battery voltage (warning).
 - 13) Battery charger failure (warning).
 - b. In addition to NFPA 110 requirements, provide the following protections/indications:
 - 1) High AC voltage (shutdown).
 - 2) Low AC voltage (shutdown).

- 3) High frequency (shutdown).
 - 4) Low frequency (shutdown).
 - 5) Overcurrent (shutdown).
 - c. Provide contacts for local and remote common alarm.
 - d. Provide lamp test function that illuminates all indicator lamps.
- 5. Other Control Panel Features:
 - a. Event log.
- C. Remote Annunciator:
 - 1. Remote Annunciator Mounting: Wall-mounted; Provide flush-mounted annunciator for finished areas and surface-mounted annunciator for non-finished areas unless otherwise indicated.
 - 2. Generator Set Status Indications:
 - a. Generator powering load (via position signal from transfer switch).
 - b. Communication functional.
 - 3. Generator Set Warning/Shutdown Indications:
 - a. Comply with NFPA 110; configurable for NFPA 110 Level 1 or Level 2, or NFPA 99 systems including but not limited to the following indications:
 - 1) Overcrank (shutdown).
 - 2) Low coolant temperature (warning).
 - 3) High coolant temperature (warning).
 - 4) High coolant temperature (shutdown).
 - 5) Low oil pressure (shutdown).
 - 6) Overspeed (shutdown).
 - 7) Low fuel level (warning).
 - 8) Low coolant level (warning/shutdown).
 - 9) Generator control not in automatic mode (warning).
 - 10) High battery voltage (warning).
 - 11) Low cranking voltage (warning).
 - 12) Low battery voltage (warning).
 - 13) Battery charger failure (warning).
 - b. Provide audible alarm with silence function.
 - c. Provide lamp test function that illuminates all indicator lamps.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install generator sets and associated accessories in accordance with NECA/EGSA 404.
- D. Arrange equipment to provide minimum clearances and required maintenance access.
- E. Unless otherwise indicated, mount generator set on properly sized, minimum 6 inch high concrete pad constructed in accordance with Section 033000.
- F. Provide required support and attachment in accordance with Section 260529.
- G. Use manufacturer's recommended oil and coolant, suitable for the worst case ambient temperatures.
- H. Provide engine exhaust piping in accordance with Section 235100, where not factory installed.
 - 1. Include piping expansion joints, piping insulation, thimble, condensation trap/drain, rain cap, hangers/supports, etc. as indicated or as required.
 - 2. Do not exceed manufacturer's maximum back pressure requirements.
- I. Provide grounding and bonding in accordance with Section 260526.
- J. Identify system wiring and components in accordance with Section 260553.

3.02 MAINTENANCE

- A. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of engine generator system for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

END OF SECTION

SECTION 263600 TRANSFER SWITCHES

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 260573 - Power System Studies: Additional criteria for the selection of equipment specified in this section.
- E. Section 263213 - Engine Generators: For interface with transfer switches.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NEMA ICS 10 Part 1 - Industrial Control and Systems Part 1: Electromechanical AC Transfer Switch Equipment 2020.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 1008 - Transfer Switch Equipment Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate compatibility of transfer switches to be installed with work provided under other sections or by others.
 - a. Engine Generators: See Section 263213.
 - 2. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.
 - 3. Coordinate arrangement of equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Coordinate the work with placement of supports, anchors, etc. required for mounting.
 - 5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product, including ratings, configurations, dimensions, finishes, weights, service condition requirements, and installed features.
- B. Shop Drawings: Include dimensioned plan views and sections indicating locations of system components, required clearances, and field connection locations. Include system interconnection schematic diagrams showing all factory and field connections.
- C. Maintenance contracts.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals

- a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
- 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 TRANSFER SWITCHES

- A. Provide complete power transfer system consisting of all required equipment, conduit, boxes, wiring, supports, accessories, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Applications:
- D. Construction Type: Either "contactor type" (open contact) or "breaker type" (enclosed contact) transfer switches complying with specified requirements are acceptable.
- E. Automatic Transfer Switch:
 - 1. Transfer Switch Type: As indicated on the drawings.
 - 2. Transition Configuration: As indicated on the drawings.
 - 3. Voltage: As indicated on the drawings.
 - 4. Ampere Rating: As indicated on the drawings.
 - 5. Neutral Configuration: Solid neutral (unswitched), except as indicated.
 - 6. Load Served: As indicated on the drawings.
 - 7. Primary Source: As indicated on the drawings.
- F. Comply with NEMA ICS 10 Part 1, and list and label as complying with UL 1008 for the classification of the intended application (e.g. emergency, optional standby).
- G. Do not use double throw safety switches or other equipment not specifically designed for power transfer applications and listed as transfer switch equipment.
- H. Load Classification: Classified for total system load (any combination of motor, electric discharge lamp, resistive, and tungsten lamp loads with tungsten lamp loads not exceeding 30 percent of the continuous current rating) unless otherwise indicated or required.
- I. Switching Methods:
 - 1. Open Transition:
 - a. Provide break-before-make transfer without a neutral position that is not connected to either source, and with interlocks to prevent simultaneous connection of the load to both sources.
 - b. Where in-phase transfer is indicated, utilize in-phase monitor to initiate transfer when phase angle difference between sources is near zero to limit in-rush currents.
 - 2. Obtain control power for transfer operation from line side of source to which the load is to be transferred.

- J. Service Conditions: Provide transfer switches suitable for continuous operation at indicated ratings under the service conditions at the installed location.
- K. Enclosures:
 - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
 - 2. Finish: Manufacturer's standard unless otherwise indicated.
- L. Short Circuit Current Rating:
 - 1. Withstand and Closing Rating: Provide transfer switches, when protected by the supply side overcurrent protective devices to be installed, with listed withstand and closing rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
- M. Automatic Transfer Switches:
 - 1. Description: Transfer switches with automatically initiated transfer between sources; electrically operated and mechanically held.
 - 2. Control Functions:
 - a. Automatic mode.
 - b. Test Mode: Simulates failure of primary/normal source.
 - c. Voltage and Frequency Sensing:
 - 1) Undervoltage sensing for each phase of primary/normal source; adjustable dropout/pickup settings.
 - 2) Undervoltage sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - 3) Underfrequency sensing for alternate/emergency source; adjustable dropout/pickup settings.
 - d. Outputs:
 - 1) Contacts for engine start/shutdown (except where direct generator communication interface is provided).
 - 2) Auxiliary contacts; one set(s) for each switch position.
 - e. Adjustable Time Delays:
 - 1) Engine generator start time delay; delays engine start signal to override momentary primary/normal source failures.
 - 2) Transfer to alternate/emergency source time delay.
 - 3) Retransfer to primary/normal source time delay.
 - 4) Engine generator cooldown time delay; delays engine shutdown following retransfer to primary/normal source to permit generator to run unloaded for cooldown period.
 - f. In-Phase Monitor (Open Transition Transfer Switches): Monitors phase angle difference between sources for initiating in-phase transfer.
 - g. Engine Exerciser: Provides programmable scheduled exercising of engine generator selectable with or without transfer to load; provides memory retention during power outage.
 - 3. Status Indications:
 - a. Connected to alternate/emergency source.
 - b. Connected to primary/normal source.
 - c. Alternate/emergency source available.
 - 4. Automatic Sequence of Operations:
 - a. Upon failure of primary/normal source for a programmable time period (engine generator start time delay), initiate starting of engine generator where applicable.
 - b. When alternate/emergency source is available, transfer load to alternate/emergency source after programmable time delay.
 - c. When primary/normal source has been restored, retransfer to primary/normal source after a programmable time delay. Bypass time delay if alternate/emergency source fails and primary/normal source is available.

- d. Where applicable, initiate shutdown of engine generator after programmable engine cooldown time delay.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Arrange equipment to provide minimum clearances and required maintenance access.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install transfer switches plumb and level.
- F. Provide grounding and bonding in accordance with Section 260526.
- G. Identify transfer switches and associated system wiring in accordance with Section 260553.

3.02 MAINTENANCE

- A. Provide to Owner a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of transfer switches for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, inspection, and testing, with a detailed schedule.

END OF SECTION

**SECTION 264300
SURGE PROTECTIVE DEVICES**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 262413 - Switchboards.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. UL 1449 - Standard for Surge Protective Devices Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.
- B. Shop Drawings: Include wiring diagrams showing all factory and field connections with wire and circuit breaker/fuse sizes.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufactured within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Field-installed, Externally Mounted Surge Protective Devices:

1. ABB/GE.
2. Current Technology; a brand of Thomas & Betts Power Solutions.
3. nVent ERICO.
4. Schneider Electric.
5. Surge Suppression, LLC (SSI).

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

- A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.
- B. Unless otherwise indicated, provide field-installed, externally-mounted or factory-installed, internally-mounted SPDs.
- C. List and label as complying with UL 1449, Type 1 when connected online side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.
- D. Protected Modes:
 1. Wye Systems: L-N, L-G, N-G, L-L.
 2. Delta Systems: L-G, L-L.
 3. Single Split Phase Systems: L-N, L-G, N-G, L-L.
 4. High Leg Delta Systems: L-N, L-G, N-G, L-L.
- E. UL 1449 Voltage Protection Ratings (VPRs):
- F. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.
- G. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

2.03 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS

- A. Surge Protective Device:
 1. Protection Circuits: Field-replaceable modular or non-modular.
 2. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.
 3. UL 1449 Nominal Discharge Current (I-n): 20 kA.
 4. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.
 5. Diagnostics:
 - a. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
 - b. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- C. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 260526 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

END OF SECTION

**SECTION 265100
INTERIOR LIGHTING**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260529 - Hangers and Supports for Electrical Systems.
- B. Section 260533.16 - Boxes for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 260923 - Lighting Control Devices.
- E. Section 265600 - Exterior Lighting.

1.02 REFERENCE STANDARDS

- A. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products 2019.
- B. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.
- C. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems 2006.
- D. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems 2006.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 924 - Emergency Lighting and Power Equipment Current Edition, Including All Revisions.
- H. UL 1598 - Luminaires Current Edition, Including All Revisions.
- I. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
 - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
 - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
 - 4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. LED Luminaires:
 - 1. Components: UL 8750 recognized or listed as applicable.
 - 2. Tested in accordance with IES LM-79 and IES LM-80.
 - 3. LED Estimated Useful Life: Minimum of 65,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 EXIT SIGNS

- A. Description: Exit signs complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.
 - 1. Number of Faces: Single- or double-face as indicated or as required for installed location.
 - 2. Directional Arrows: As indicated or as required for installed location.

2.04 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Dimmable LED Drivers:
 - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
 - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Exit Signs:
- I. Install lamps in each luminaire.

END OF SECTION

**SECTION 265600
EXTERIOR LIGHTING**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.16 - Boxes for Electrical Systems.
- D. Section 260923 - Lighting Control Devices.
- E. Section 262726 - Wiring Devices: Receptacles for installation in poles.
- F. Section 265100 - Interior Lighting.

1.02 REFERENCE STANDARDS

- A. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems 2000 (Reaffirmed 2006).
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 1598 - Luminaires Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
- C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
 - 1. LED Luminaires:
 - a. Include estimated useful life, calculated based on IES LM-80 test data.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.

- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

- A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.

2.03 BALLASTS AND DRIVERS

- A. Ballasts/Drivers - General Requirements:
 - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
 - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

2.04 POLES

- A. All Poles:
 - 1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
 - 2. Unless otherwise indicated, provide with the following features/accessories:
 - a. Anchor bolts with leveling nuts or leveling shims.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Install accessories furnished with each luminaire.
- G. Bond products and metal accessories to branch circuit equipment grounding conductor.
- H. Install lamps in each luminaire.

END OF SECTION

**SECTION 270529
HANGERS AND SUPPORTS FOR COMMUNICATIONS SYSTEMS**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 271000 - Structured Cabling.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- D. BICSI ITSIMM - Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition 2022.
- E. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition 2019.
- F. MFMA-4 - Metal Framing Standards Publication 2004.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. TIA-569 - Telecommunications Pathways and Spaces 2019e.
- J. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with actual equipment and components to be installed.
 - 2. Coordinate work to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at installed locations.
 - 4. Coordinate arrangement of supports with ductwork, piping, equipment and other potential conflicts.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has cured; see Section 033000.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Comply with the following. Where requirements differ, comply with most stringent.
 - a. TIA-569.
 - b. NFPA 70.
 - c. Requirements of authorities having jurisdiction.
 - 2. Provide required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for complete installation of communications work.

3. Provide products listed, classified, and labeled as suitable for purpose intended, where applicable.
4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for load to be supported with minimum safety factor of _____. Include consideration for vibration, equipment operation, and shock loads where applicable.
5. Do not use products for applications other than as permitted by NFPA 70 and product listing.
6. Steel Components: Use corrosion-resistant materials suitable for environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit Supports: Straps and clamps suitable for conduit to be supported.
 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Cable Supports: Suitable for cables to be supported, including but not limited to J-hooks, bridle rings, drive rings, and flexible harnesses/slings.
 1. Applications:
 2. Comply with TIA-569.
 3. Cable Supports Installed in Spaces Used for Environmental Air: Plenum rated; listed and labeled as complying with UL 2043, suitable for use in air-handling spaces.
- D. Outlet Box Supports: Hangers and brackets suitable for boxes to be supported.
- E. Metal Channel/Strut Framing Systems:
 1. Description: Factory-fabricated, continuous-slot, metal channel/strut and associated fittings, accessories, and hardware required for field assembly of supports.
 2. Comply with MFMA-4.
- F. Hanger Rods: Threaded, zinc-plated steel unless otherwise indicated.
- G. Anchors and Fasteners:
 1. Unless otherwise indicated and where not otherwise restricted, use anchor and fastener types indicated for specified applications.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install hangers and supports in accordance with NECA 1, BICSI ITSIMM, and BICSI N1.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.
- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- G. Equipment Support and Attachment:
 1. Use metal, fabricated supports or supports assembled from metal channel/strut to support equipment as required.
 2. Use metal channel/strut secured to studs to support equipment surface mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
 3. Use metal channel/strut to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

- H. Secure fasteners in accordance with manufacturer's recommended torque settings.
- I. Remove temporary supports.

END OF SECTION

SECTION 270533.13
CONDUIT FOR COMMUNICATIONS SYSTEMS

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 260533.13 - Conduit for Electrical Systems.
- C. Section 271000 - Structured Cabling.

1.02 REFERENCE STANDARDS

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
- B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
- C. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit 2018.
- D. BICSI ITSIMM - Information Technology Systems Installation Methods Manual (ITSIMM), 8th Edition 2022.
- E. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition 2019.
- F. BICSI TDMM - Telecommunications Distribution Methods Manual, 14th Edition 2020.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- H. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
- I. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.
- J. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- K. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Metal Conduit and Intermediate Metal Conduit 2018.
- L. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
- M. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.
- N. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- O. TIA-568.0 - Generic Telecommunications Cabling for Customer Premises 2020e.
- P. TIA-569 - Telecommunications Pathways and Spaces 2019e.
- Q. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- R. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- S. UL 6A - Electrical Rigid Metal Conduit-Aluminum, Red Brass, and Stainless Steel Current Edition, Including All Revisions.
- T. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
- U. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.
- V. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- W. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- X. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- Y. UL 797A - Electrical Metallic Tubing - Aluminum and Stainless Steel Current Edition, Including All Revisions.
- Z. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate minimum sizes of conduits with actual type and quantity of cables to be installed.
 - 2. Coordinate arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts.
 - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment.
 - 4. Coordinate work to provide roof penetrations that preserve integrity of roofing system and do not void roof warranty.
 - 5. Notify Architect of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
 - 1. Do not begin installation of communications cables until installation of conduit between termination points is complete.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70, TIA-569, BICSI ITSIMM, BICSI TDMM, manufacturers' instructions, and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use conduit types indicated for specified applications. Where more than one listed application applies, comply with most restrictive requirements. Where conduit type for particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
 - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), PVC-coated galvanized steel rigid metal conduit (RMC), or rigid PVC conduit.
 - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), PVC-coated galvanized steel rigid metal conduit (RMC), or rigid PVC conduit.
- D. Embedded Within Concrete:
 - 1. Within Slab on Grade: Not permitted.
 - 2. Within Slab Above Ground: Not permitted.
- E. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
- F. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit (RMC), stainless steel rigid metal conduit (RMC), galvanized steel intermediate metal conduit (IMC), stainless steel intermediate metal conduit (IMC), galvanized steel electrical metallic tubing (EMT), or stainless steel electrical metallic tubing (EMT).
- G. Flexible Connections to Vibrating Equipment:
 - 1. Dry Locations: Use flexible metal conduit.
 - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
 - 3. Maximum Length: 6 feet unless otherwise indicated.

2.02 CONDUIT - GENERAL REQUIREMENTS

- A. Comply with NFPA 70 and TIA-569.
- B. Provide conduit, fittings, supports, and accessories required for complete communications pathway.
- C. Provide products listed, classified, and labeled as suitable for purpose intended.

- D. Where conduit size is not indicated, size to comply with NFPA 70, TIA-569, and BICSI TDMM, but not less than applicable minimum size requirements specified. Where specified standards differ, comply with most stringent.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- B. Fittings:
 - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
 - 4. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
 - a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

2.04 STAINLESS STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC stainless steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6A.
- B. Fittings:
 - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 6A.
 - 2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
 - 3. Connectors and Couplings: Use threaded fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
 - 4. Conduit Bodies: Standard conduit bodies designed for electrical raceways are not permitted.

2.05 GALVANIZED STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
 - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use threaded fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
 - 4. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
 - a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

2.06 STAINLESS STEEL INTERMEDIATE METAL CONDUIT (IMC)

- A. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.
- B. Fittings:
 - 1. Nonhazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B or UL 1242.
 - 2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
 - 3. Connectors and Couplings: Use threaded fittings only. Threadless fittings, including set screw and compression/gland types, are not permitted.
 - 4. Conduit Bodies: Standard conduit bodies designed for electrical raceways are not permitted.

2.07 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

- A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.
- B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil, 0.040 inch.
- C. PVC-Coated Boxes and Fittings:
 - 1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
 - 2. Nonhazardous Locations: Use boxes and fittings listed and labeled as complying with UL 514A, UL 514B, or UL 6.
 - 3. Material: Use steel or malleable iron.
 - 4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil, 0.040 inch.
 - 5. Conduit Bodies: Standard conduit bodies designed for electrical raceways are not permitted.
- D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil, 0.015 inch.

2.08 FLEXIBLE METAL CONDUIT (FMC)

- A. Description: NFPA 70, Type FMC standard-wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Conduit Bodies: Standard conduit bodies designed for electrical raceways are not permitted.

2.09 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
 - a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

2.10 GALVANIZED STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT galvanized steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- B. Fittings:
 - 1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
 - 2. Material: Use steel or malleable iron.
 - 3. Connectors and Couplings: Use compression/gland or set-screw type.
 - a. Do not use indenter type connectors and couplings.
 - 4. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
 - a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

2.11 STAINLESS STEEL ELECTRICAL METALLIC TUBING (EMT)

- A. Description: NFPA 70, Type EMT stainless steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797A.
- B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use stainless steel with corrosion resistance equivalent to conduit.
3. Connectors and Couplings: Use compression/gland or set-screw type.
4. Conduit Bodies: Standard conduit bodies designed for electrical raceways are not permitted.

2.12 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

- A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage.
- B. Fittings:
 1. Manufacturer: Same as manufacturer of conduit to be connected.
 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.
 3. Conduit Bodies: Use only conduit bodies specifically designed for communications cabling. Standard conduit bodies designed for electrical raceways are not permitted.
 - a. Comply with TIA-568.0 minimum bend radius requirements for fiber optic cables.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in accordance with NECA 1, BICSI ITSIMM, and BICSI N1.
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install galvanized steel intermediate metal conduit (IMC) in accordance with NECA 101.
- E. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by manufacturer.
- F. Install galvanized steel electrical metallic tubing (EMT) in accordance with NECA 101.
- G. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- H. Conduit Support:
 1. Secure and support conduits in accordance with NFPA 70 using suitable supports and methods approved by authorities having jurisdiction.
 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- I. Connections and Terminations:
 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
 3. Use suitable adapters where required to transition from one type of conduit to another.
 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
 6. Provide insulating bushings, insulated throats, or listed metal fittings with smooth, rounded edges at conduit terminations to protect cables.
 7. Secure joints and connections to provide mechanical strength and electrical continuity.
- J. Penetrations:
 1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
 2. Make penetrations perpendicular to surfaces unless otherwise indicated.

3. Provide sleeves and/or slots for penetrations as indicated or as required to facilitate installation.
 4. Conceal bends for conduit risers emerging above ground.
 5. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
 6. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty.
 7. Install firestopping to preserve fire resistance rating of partitions and other elements; see Section 078400.
- K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed cables or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
 2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
 3. Where conduits are subject to earth movement by settlement or frost.
- L. Provide grounding and bonding.
- M. Identify conduits.

END OF SECTION

**SECTION 271000
STRUCTURED CABLING - COMMScope SYSTIMAX/UNIPRISE**

PART 1 GENERAL

1.01 REFERENCE STANDARDS

- A. BICSI N1 - Installation Practices for Telecommunications and ICT Cabling and Related Cabling Infrastructure, 1st Edition 2019.
- B. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment 2005e.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set 2020.
- E. TIA-568.3 - Optical Fiber Cabling and Components Standard 2016d.
- F. TIA-569 - Telecommunications Pathways and Spaces 2019e.
- G. TIA-606 - Administration Standard for Telecommunications Infrastructure 2021d.
- H. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises 2019d.
- I. UL 2024 - Standard for Cable Routing Assemblies and Communications Raceways Current Edition, Including All Revisions.
- J. UL 2416 - Audio/Video, Information and Communication Technology Equipment Cabinet, Enclosure and Rack Systems Current Edition, Including All Revisions.
- K. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances Current Edition, Including All Revisions.
- L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers Current Edition, Including All Revisions.

1.02 ADMINISTRATIVE REQUIREMENTS

1.03 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: CommScope, Inc; SYSTIMAX; www.commscope.com/#sle.

2.02 STRUCTURED CABLING SYSTEM - GENERAL REQUIREMENTS

- A. Comply with the following:
 1. TIA-568 (SET).
 2. TIA-569.
 3. TIA-607.
 4. NFPA 70.
 5. Requirements of authorities having jurisdiction.
 6. Applicable local codes.

2.03 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES

- A. Fiber Optic Cables:
 1. Cable Applications:
 - a. Plenum Applications: Use listed NFPA 70 Type OFNP plenum cable.
 - b. Riser Applications: Use listed NFPA 70 Type OFNR riser cable or Type OFNP plenum cable.
 - c. General Applications: Use listed NFPA 70 Type OFN/OFNG general purpose cable, Type OFNR riser cable, or Type OFNP plenum cable.
- B. Fiber Optic Connectors:
 1. Comply with TIA-568.3, match cable.
 2. Connector Type: Type LC unless otherwise indicated or required.
- C. Fiber Optic Cable Assemblies:
 1. Description: Factory-fabricated cable assemblies with fiber optic connectors at each end; length as indicated or as required.
 2. Comply with TIA-568.3.

2.04 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- A. Fiber Panels:
 1. Designed for mounting in 19-inch wide equipment racks complying with EIA/ECA-310 unless otherwise indicated.
 2. Comply with TIA-568.3, match cable.
 3. Flammability: Comply with UL 94.
 4. Include provisions for front port labeling.
 5. Provide rear cable management tray with removable cover on back of panel.
 6. Provide dust covers for unused ports.
- B. Equipment Racks:
 1. Comply with EIA/ECA-310; 19 inches wide unless otherwise indicated.
 2. Listed as complying with UL 2416.
 3. Floor-Mounted Rack Material: Aluminum or steel.
 4. Static Load Rating:
 - a. Provide racks and shelves with static load rating suitable for loads to be supported.
 - b. Floor-Mounted 2-Post Equipment Racks: 1,000 lb, minimum.
 - c. Floor-Mounted 4-Post Equipment Racks: 2,000 lb, minimum.
- C. Horizontal/Vertical Cable Managers:
 1. Compatible with specified equipment racks.
- D. Cable Runways:

1. Provide complete cable runway system consisting of required components, fittings, supports, and accessories; routing as indicated or as required.
 2. Material: Powder-coated steel.
 3. Color: Black.
 4. Side Rail Height: 1.5 inches for straight sections and flat bends.
 5. Static Load Rating: 45 lb, minimum.
- E. Fiber Raceways:
1. Description: Raceway system specifically designed for routing and protection of fiber optic cables; suitable for overhead, under floor, and above ceiling applications.
 2. Provide complete fiber raceway system consisting of required components, fittings, supports, and accessories; routing as indicated or as required.
 3. Material: Thermoplastic; nylon and PVC are not acceptable.
 4. Color: Yellow.
 5. Span: 6 feet.
 6. Joining Method: Mechanical; glue and solvents are not acceptable.
 7. Plenum rated; listed as complying with UL 2024.
 8. Flammability: Comply with UL 94.
 9. Minimum Cable Bend Radius: 2 inches throughout system.

2.05 COMMUNICATIONS FACEPLATES

- A. Listed as complying with UL 514C.
- B. Compatible with specified modular jacks/inserts.
- C. Provide blank inserts/dust covers for unused ports.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install products in accordance with manufacturer's written instructions.
- B. Comply with BICSI N1 and TIA-568 (SET).
- C. Cable Installation in Raceway:
 1. Do not damage cables or exceed manufacturer's recommended maximum pulling tension.
 2. Use wire-pulling lubricant recommended by manufacturer where necessary.
- D. Floor-Mounted Equipment Racks: Permanently anchor to floor in accordance with manufacturer's recommendations.
- E. Identify components in accordance with TIA-606.
- F. Provide grounding and bonding in accordance with TIA-607.

END OF SECTION

SECTION 271000 STRUCTURED CABLING

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260536 - Cable Trays for Electrical Systems.
- D. Section 260533.16 - Boxes for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products.
- F. Section 262726 - Wiring Devices.
- G. Section 270529 - Hangers and Supports for Communications Systems.
- H. Section 270533.13 - Conduit for Communications Systems.

1.02 REFERENCE STANDARDS

- A. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment 2005e.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices 1988a (Reaffirmed 2012).
- D. TIA-606 - Administration Standard for Telecommunications Infrastructure 2021d.
- E. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises 2019d.
- F. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.
 - 2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
 - 3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
- D. Field Test Reports.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements.

Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
 1. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
 2. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F at relative humidity of 0 to 95 percent, noncondensing.
 3. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
- B. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
 1. Locate main distribution frame as indicated on the drawings.
- C. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 PATHWAYS

- A. Conduit: See section 270533.13.
- B. Cable Trays: See Section 260536.
- C. Underground Service Entrance: Rigid polyvinyl chloride (PVC) conduit, Schedule 40.
- D. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.

2.03 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES

- A. Fiber Optic Interconnecting Devices:
 1. Connector Type: Type LC.
 2. Connector Performance: 500 mating cycles, when tested in accordance with TIA-455-21.
 3. Maximum Attenuation/Insertion Loss: 0.3 dB.

2.04 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- A. Fiber Optic Cross-Connection Equipment:

1. Patch Panels for Fiber Optic Cabling: Sized to fit EIA/ECA-310 standard 19 inch wide equipment racks; 0.09 inch thick aluminum.
 - a. Adapters: As specified above under FIBER OPTIC CABLE AND INTERCONNECTING DEVICES; maximum of 24 duplex adaptors per standard panel width.
 - b. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
 - c. Provide incoming cable strain relief and routing guides on back of panel.
 - d. Provide rear cable management tray at least 8 inches deep with removable cover.
 - e. Provide dust covers for unused adaptors.
- B. Backboards: Interior grade plywood without voids, 3/4 inch thick; UL-labeled fire-retardant.
 1. Size: As indicated on drawings.
 2. Do not paint over UL label.
- C. Equipment Frames, Racks and Cabinets:
 1. Component Racks: EIA/ECA-310 standard 19 inch wide.
 2. Floor Mounted Racks: Aluminum or steel construction with corrosion resistant finish; vertical and horizontal cable management channels, top and bottom cable troughs, and grounding lug.
 3. Wall Mounted Cabinets: Front doors with locks, louvered side panels, top and bottom cable access, and ground lug.
 4. Cabinets: Steel construction with corrosion resistant finish.
 5. Locks: Keyed alike.
- D. Cable Management:

2.05 COMMUNICATIONS OUTLETS

- A. Outlet Boxes: Comply with Section 260533.16.
 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
- B. Wall Plates:
 1. Comply with system design standards and UL 514C.
 2. Accepts modular jacks/inserts.
 3. Capacity:
 4. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified in Section 262726.

2.06 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Comply with Communication Service Provider requirements.
- B. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

3.02 INSTALLATION OF PATHWAYS

- A. Install pathways with the following minimum clearances:
 1. 48 inches from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
 2. 12 inches from power conduits and cables and panelboards.
 3. 5 inches from fluorescent and high frequency lighting fixtures.
 4. 6 inches from flues, hot water pipes, and steam pipes.
- B. Outlet Boxes:
 1. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of telecommunications outlets provided under this section.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

- A. Cabling:
 - 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
 - 2. Do not over-cinch or crush cables.
 - 3. Do not exceed manufacturer's recommended cable pull tension.
 - 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
 - 1. At Distribution Frames: 120 inches.
 - 2. At Outlets - Optical Fiber: 39 inches.
- C. Fiber Optic Cabling:
 - 1. Prepare for pulling by cutting outer jacket for 10 inches from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
 - 2. Support vertical cable at intervals as recommended by manufacturer.
- D. Wall-Mounted Racks and Enclosures:
 - 1. Install to plywood backboards only, unless otherwise indicated.
 - 2. Mount so height of topmost panel does not exceed 78 inches above floor.
- E. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.
- F. Identification:
 - 1. Use wire and cable markers to identify cables at each end.
 - 2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.
 - 3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Comply with inspection and testing requirements of specified installation standards.
- C. Visual Inspection:
 - 1. Inspect cable jackets for certification markings.
 - 2. Inspect cable terminations for color coded labels of proper type.
 - 3. Inspect outlet plates and patch panels for complete labels.
- D. Testing - Fiber Optic Cabling:
 - 1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests.
- E. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

END OF SECTION

**SECTION 281000
ACCESS CONTROL**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 087100 - Door Hardware: Electrically operated door hardware, for interface with access control system.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 271000 - Structured Cabling: Data cables for access control system IP network connections.
- E. Section 284600 - Fire Detection and Alarm: For interface with access control system.

1.02 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. UL 294 - Access Control System Units Current Edition, Including All Revisions.
- C. UL 1076 - Proprietary Burglar Alarm Units and Systems Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate the work with other installers to provide suitable door hardware as required for both access control functionality and code compliance.
 - 2. Coordinate the placement of readers with millwork, furniture, equipment, etc. installed under other sections or by others.
 - 3. Coordinate the work with other installers to provide power for equipment at required locations.
 - 4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

- A. Shop Drawings: Include plan views indicating locations of system components and proposed size, type, and routing of conduits and/or cables. Include elevations and details of proposed equipment arrangements. Include system interconnection schematic diagrams. Include requirements for interface with other systems.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each system component. Include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.
- C. Maintenance contracts.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.

- c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 ACCESS CONTROL SYSTEM REQUIREMENTS

- A. Provide new access control system consisting of required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
 - 1. Access Control Units and Readers: Listed and labeled as complying with UL 294.
- C. System shall be Keyscan, installed by a certified Keyscan Enterprise Partner.

2.02 ACCESS CONTROL UNITS AND SOFTWARE

- A. Provide access control units and software compatible with readers to be connected.
- B. Unless otherwise indicated, provide software and licenses required for fully operational system.
- C. Access Control Unit:
 - 1. Operating Modes Supported:
 - a. Card and PIN.
- D. Computers:

2.03 ACCESS CONTROL POINT PERIPHERALS

- A. Provide devices compatible with control units and software.
- B. Provide devices suitable for operation under the service conditions at the installed location.
- C. Readers and Keypads:
 - 1. General Requirements:
 - a. Provide readers compatible with credentials to be used.
 - b. Color: To be selected by Architect from manufacturer's available standard colors.
- D. Door Locking Devices (Electric Strikes and Magnetic Locks): Comply with Section 087100.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install access control system in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Provide grounding and bonding in accordance with Section 260526.
- D. Identify system wiring and components in accordance with Section 260553.

3.02 MAINTENANCE

- A. Provide to Owner, a proposal as an alternate to the base bid, a separate maintenance contract for the service and maintenance of access control system for two years from date of Substantial Completion; Include a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.

END OF SECTION

**SECTION 284600
FIRE DETECTION AND ALARM**

PART 1 GENERAL

1.01 RELATED REQUIREMENTS

- A. Section 142400 - Hydraulic Elevators: Elevator systems monitored and controlled by fire alarm system.
- B. Section 211300 - Fire-Suppression Sprinkler Systems: Supervisory, alarm, and actuating devices installed in sprinkler system.
- C. Section 213000 - Fire Pumps: Supervisory devices.

1.02 REFERENCE STANDARDS

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- B. ADA Standards - 2010 ADA Standards for Accessible Design 2010.
- C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits 2002 (Corrigendum 2012).
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 - National Fire Alarm and Signaling Code Most Recent Edition Cited by Referring Code or Reference Standard.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Evidence of designer qualifications.
- C. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
 - 1. Copy (if any) of list of data required by authority having jurisdiction.
 - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
 - 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
 - 4. System zone boundaries and interfaces to fire safety systems.
 - 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
 - 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
 - 7. List of all devices on each signaling line circuit, with spare capacity indicated.
 - 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
 - 9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
 - 10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
 - 11. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
 - 12. Certification by Contractor that the system design complies with Contract Documents.
- D. Evidence of installer qualifications.
- E. Inspection and Test Reports:
 - 1. Submit inspection and test plan prior to closeout demonstration.
 - 2. Submit documentation of satisfactory inspections and tests.
 - 3. Submit NFPA 72 "Inspection and Test Form," filled out.

- F. Operating and Maintenance Data: See Section 017800 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
 - 1. Complete set of specified design documents, as approved by authority having jurisdiction.
 - 2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
 - 3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
 - 4. List of recommended spare parts, tools, and instruments for testing.
 - 5. Replacement parts list with current prices, and source of supply.
 - 6. Detailed troubleshooting guide and large scale input/output matrix.
 - 7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
 - 8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- G. Project Record Documents: See Section 017800 for additional requirements; have one set available during closeout demonstration:
 - 1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
 - 2. "As installed" wiring and schematic diagrams, with final terminal identifications.
 - 3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- H. Closeout Documents:
 - 1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
 - 2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 FIRE ALARM SYSTEM

- A. Fire Alarm System: Provide a new dedicated function fire alarm system and associated accessories for the following functions:
 - 1. Elevator lobby and elevator machine room initiation detection devices for elevator recall function.
 - 2. Elevator hoistway initiation devices for elevator shutdown functions.
 - 3. Building sprinkler system flow and taper switch monitoring and annunciation.
 - 4. Fire pump status monitoring and annunciation.
 - 5. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
 - a. ADA Standards.
 - b. The requirements of the local authority having jurisdiction , which is the City of Madison.
 - c. Applicable local codes.
 - d. Contract Documents (drawings and specifications).
 - e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
 - 6. Dedicated Function Fire Alarm Control Unit (DFFACU): New, located as indicated on the floor plans.
- B. Supervising Stations and Fire Department Connections:
 - 1. Public Fire Department Notification: By remote supervising station alarm initiated from the DFFACU.
- C. Circuits:
 - 1. Initiating Device Circuits (IDC): Class B, Style A.
 - 2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
 - 3. Notification Appliance Circuits (NAC): Class B, Style W.
- D. Spare Capacity:
 - 1. DedicFire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.
- E. Power Sources:
 - 1. Primary: Dedicated branch circuits of the facility power distribution system.
 - 2. Secondary: Storage batteries.
 - 3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.

2.02 FIRE SAFETY SYSTEMS INTERFACES

- A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
 - 1. Sprinkler water control valves.
 - 2. Sprinkler tamper
 - 3. Dry-pipe sprinkler system pressure.
 - 4. Dry-pipe sprinkler valve room low temperature.
 - 5. Fire pump.
 - 6. Elevator shut-down control circuits.
 - 7. EI
- B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
 - 1. Sprinkler water flow.
 - 2. Elevator lobby, elevator hoistway, and elevator machine room smoke detectors.
- C. Elevators:
 - 1. Elevator lobby, hoistway, and machine room smoke detectors: Elevator recall for fire fighters' service.

2. Elevator Machine Room Heat Detector: Shut down elevator power prior to hoistway sprinkler activation.
3. Sprinkler pressure or waterflow: Shut down elevator power prior to hoistway sprinkler activation.

2.03 COMPONENTS

- A. General:
 1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
 2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Dedicated Function Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Initiating Devices:
 1. Addressable Systems:
 - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
 - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
- D. Notification Appliances:
 1. Speakers: Speaker devices in outdoor locations. Outdoor locations include those locations exposed to the exterior elements and those locations protected from the elements, but located in interior, unheated spaces of the open parking structure. Speakers in outdoor locations shall be weatherproof rated similar to Siemens model 2566 S-HP Speaker Weatherproof Series. Speakers by alternate manufacturers will be considered and shall be reviewed for compliance with the specified device.
- E. Circuit Conductors: Copper or optical fiber; provide 200 feet extra; color code and label.
- F. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- G. Locks and Keys: Deliver keys to Owner.
- H. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
 2. Provide one for each control unit where operations are to be performed.
 3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
 4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

3.02 INSPECTION AND TESTING FOR COMPLETION

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.

3.03 CLOSEOUT

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
 - 1. Be prepared to conduct any of the required tests.
 - 2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
 - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
 - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
 - 5. Repeat demonstration until successful.

3.04 MAINTENANCE

- A. See Section 017000 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide to Owner, a proposal as an alternate to the base bid, for a maintenance contract for entire warranty period, to include the work described below; include the total cost of contract, proposal to be valid at least until 30 days after date of Substantial Completion.
- C. Perform routine inspection, testing, and preventive maintenance required by NFPA 72, including:
 - 1. Maintenance of fire safety interface and supervisory devices connected to fire alarm system.
 - 2. Repairs required, unless due to improper use, accidents, or negligence beyond the control of the maintenance contractor.
 - 3. Record keeping required by NFPA 72 and authorities having jurisdiction.
- D. Provide trouble call-back service upon notification by Owner:
 - 1. Provide on-site response within 2 hours of notification.
 - 2. Include allowance for call-back service during normal working hours at no extra cost to Owner.
 - 3. Owner will pay for call-back service outside of normal working hours on an hourly basis, based on actual time spent at site and not including travel time; include hourly rate and definition of normal working hours in maintenance contract.
- E. Provide a complete description of preventive maintenance, systematic examination, adjustment, cleaning, inspection, and testing, with a detailed schedule.
- F. Maintain a log at each fire alarm control unit, listing the date and time of each inspection and call-back visit, the condition of the system, nature of the trouble, correction performed, and parts replaced. Submit duplicate of each log entry to Owner's representative upon completion of site visit.
- G. Comply with Owner's requirements for access to facility and security.

END OF SECTION

**SECTION 31 05 00
COMMON WORK RESULTS FOR EARTHWORK**

PART 1 GENERAL

1.01 SCOPE

- A. This section provides information common to two or more technical site work specification sections or items that are of a general nature, and not included in other sections. This section applies to ALL site work, as applicable. Included are the following topics:

PART 1 GENERAL

Scope
Related Work
Referenced Organizations
Referenced Documents
Quality Assurance
Safety
Permits
Construction Limits
Submittals
Off-Site Storage
Codes
Certifications and Inspections

PART 2 MATERIALS

Barricades, Signs, and Warning Devices
Temporary Plastic Barrier Fencing

PART 3 EXECUTION

Maintenance of Site Access/Egress
Continuity of Existing Traffic/Parking and Traffic Control
Protection and Continuity of Existing Utilities
Protection of Existing Work and Facilities
Stormwater/Excavation Water Management

1.02 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section:
1. Section 31 20 00 - Earthmoving
 2. Section 31 22 16.15 - Subgrade Preparation
 3. Section 32 91 19 - Topsoil-Select Fill Materials and Application

1.03 REFERENCED ORGANIZATIONS

- A. Applicable provisions of Division 1 shall govern all work under this section.
- B. Abbreviations of organizations referenced in these specifications are as follows:
- | | |
|--------|--|
| AASHTO | American Association of State Highway and Transportation Officials |
| ACPA | American Concrete Pipe Association |
| ANSI | American National Standards Institute |
| ASCE | American Society of Civil Engineers |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| AWWA | American Water Works Association |
| AWS | American Welding Society |
| FHA | Federal Highway Administration |
| EPA | Environmental Protection Agency |
| NEC | National Electric Code |
| NEMA | National Electrical Manufacturers Association |
| NFPA | National Fire Protection Association |
| NSF | National Sanitation Foundation |

OSHA	Occupational Safety and Health Administration
STI	Steel Tank Institute
UL	Underwriters Laboratories Inc.
WDNR	State of Wisconsin Department of Natural Resources
WISDOT	State of Wisconsin Department of Transportation

1.04 REFERENCED DOCUMENTS

- A. Where reference is made to the "Construction Standards", it shall be construed to mean the City of Madison's Construction Standards, as they may pertain, except the method of measurement and basis of payment shall not apply.
- B. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the "Geotechnical Report", it shall be construed to mean the geotechnical report provided in Section 02 32 00.

1.05 QUALITY ASSURANCE

- A. Provide materials and products as required by individual specification sections. Refer to General Conditions of the Construction Contract regarding substitutions.
- B. Provide quality assurance testing and reporting as required by individual specification sections.

1.06 SAFETY

- A. Contractor is solely responsible for worksite safety.
- B. Perform all work in accordance with applicable OSHA, state and local safety standards.
- C. Contact Diggers Hotline at 1-800-242-8511 in accordance with statutory requirements. Request that non-member utilities and private utilities be located by the appropriate parties.

1.07 PERMITS

- A. Unless otherwise noted in the Contract Documents, Contractor shall be responsible for obtaining and paying for all permits necessary to complete the work.

1.08 CONSTRUCTION LIMITS

- A. Construction Limits are defined by lines denoted as Construction Fencing/Limits of Disturbance as indicated on the Drawings. In the absence of such a designation on the Drawings, confine work to the minimum area reasonably necessary to undertake the work as determined by the Owner's Construction Representative. In no case shall construction activities extend beyond property lines or construction easements.
- B. The Contractor shall restore all disturbed areas in accordance with the Drawings and Specifications. If Drawings and Specifications do not address restoration of specific areas, these areas will be restored to pre-construction conditions as approved by the Owner's Construction Representative.
- C. Coordinate work under this project with work by Owner's Construction Representative and other contractors providing separate work on the site related to other contracts.

1.09 SUBMITTALS

- A. Refer also to the General Conditions and Division 1.
- B. Submit manufacturer's shop drawings, product data, samples, substitutions and Operation and Maintenance (O&M) data for approval as required by individual specification sections.

- C. Submittals shall be provided to the Owner's Construction Representative for review and approval, unless otherwise directed. Submittals shall be sent electronically by email in *.pdf format unless otherwise directed.

1.10 OFF-SITE STORAGE

- A. Refer to Division 1.
- B. In general, the payments for materials stored off-site will only be considered in instances where there is limited space available for storage on the site. Prior approval by the Owner's Construction Representative, together with the execution of a Storage Agreement will be required.

1.11 CODES

- A. Comply with the requirements of all applicable, local, state, and federal codes.

1.12 CERTIFICATIONS AND INSPECTIONS

- A. Refer to the General Conditions.
- B. Obtain and pay for all required sampling, testing, inspections, and certifications except those expressly listed as provided by the City or Owner in the Contract Documents. Deliver originals of certificates and documents to the Owner's Construction Representative within three days; provide copies to the Owner's Construction Representative. Include copies of the certifications and documents in the O&M Manual.

PART 2 MATERIALS

2.01 BARRICADES, SIGNS, AND WARNING DEVICES

- A. Traffic barricades, traffic signs, and warning devices shall meet the requirements of current applicable OSHA standards and MUTCD.

2.02 TEMPORARY PLASTIC BARRIER FENCING

- A. UV stabilized high-density polyethylene barrier fence free of holes tears and other defects. Provide 5-foot tall fence in diamond or rectangular pattern. Fencing shall be "safety orange" color, unless otherwise noted.
- B. Posts for temporary plastic barrier fencing shall be 5 feet tall, minimum 12-gauge, painted metal posts.

PART 3 EXECUTION

3.01 MAINTENANCE OF SITE ACCESS/EGRESS

- A. Unless otherwise shown or directed, maintain existing access and egress to the facility throughout construction. Contact the City and Owner's Construction Representative prior to any construction activities to obtain directives for preferred access to the site. Maintain ANSI A117 compliant access to the high school site for disabled persons, delivery access, emergency vehicle access, and emergency egress. Do not interrupt access and egress without prior written approval from the Owner's Construction Representative.

3.02 CONTINUITY OF EXISTING TRAFFIC/PARKING AND TRAFFIC CONTROL

- A. Do not interrupt or change existing traffic, delivery, or parking without prior written approval from the City and Owner's Construction Representative. When interruption is required, coordinate schedule with the City and Owner's Construction Representative to minimize disruptions. When working in public right-of-way, obtain all necessary approvals and permits from the City if not provided by the Owner.
- B. When Contractor's activities impede or obstruct traffic flow, Contractor shall provide traffic control devices, signs, and flaggers in accordance with other Contract Documents and current applicable OSHA standards and MUTCD. Contractor shall be responsible for all costs associated with temporary traffic control. All barricades, signs, and warning devices shall be included under the traffic control bid item.

3.03 PROTECTION AND CONTINUITY OF EXISTING UTILITIES

- A. Verify the locations of any water, drainage, gas, sewer, electric, drainage, gas, sewer, electric, telephone/communication, fuel, steam lines or other utilities and site features which may be encountered in any excavations or other sitework. All lines shall be properly underpinned and supported to avoid disruption of service.
- B. Do not interrupt or change existing utilities without prior written approval from the Owner's Construction Representative, affected utilities, and users. Notify all users impacted by outages a minimum of 48 hours in advance of outage. Notification shall be provided in writing and describe the nature and duration of outages and provide the name and number of Contractor's foreman or other contact.
- C. Any service connections encountered which are to be removed shall be cut off at the limits of the excavation and capped in accordance with the requirements of applicable codes and any specifications governing such removals.

3.04 PROTECTION OF EXISTING WORK AND FACILITIES

- A. Verify the locations of, and protect, any signs, paved surfaces, buildings, structures, landscaping, streetlights, utilities, and all other such facilities that may be encountered or interfered with during the progress of the work. Take measures necessary to safeguard all existing work and facilities that are outside the limits of the work or items that are within the construction limits but are intended to remain. Report any damage to existing facilities to the Owner's Construction Representative immediately. Correct and pay for all damages.

3.05 STORMWATER/EXCAVATION WATER MANAGEMENT

- A. Control grading around structures, pitch ground to prevent water running into excavated areas.
- B. Pits, trenches within building line, and other excavations shall be maintained and free of water.
- C. Provide trenching, pumping, other facilities required.
- D. Notify Owner's Construction Representative in the event that springs or running water are encountered in excavation; provide discharge by trenches, drains, pumping to point outside of excavation. Provide information to Owner's Construction Representative of points and areas that water will be discharged. At the City and Owner's Construction Representative's option, the Contractor shall drain the spring to the storm sewer system by the use of field tile.
- E. Establish and maintain an onsite Erosion Control Maintenance Log. The log shall document erosion control installation locations and date of establishment, rainfall event dates and amounts, erosion control failure locations, corrective measures taken and weekly inspection documentation. This log shall be available onsite during the entire construction process and available to the Owner, Owner's Construction Representative, Governing Municipality, and authorized WDNR staff.
- F. Be responsible for control measures to prevent damage from flooding, erosion, and sedimentation to on-site and off-site areas.

END OF SECTION

**SECTION 310916.21
PILE LOAD TESTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pile load testing and documenting results.

1.02 RELATED REQUIREMENTS

- A. Section 014000 - Quality Requirements: Testing laboratory services.
- B. Section 316613.13 - Rammed Aggregate Piers.

1.03 REFERENCE STANDARDS

- A. ASTM D1143/D1143M - Standard Test Methods for Deep Foundation Elements Under Static Axial Compressive Load 2020.
- B. ASTM D3689/D3689M - Standard Test Methods for Deep Foundation Elements Under Static Axial Tensile Load 2022.
- C. ASTM D3966/D3966M - Standard Test Methods for Deep Foundation Elements Under Static Lateral Load 2022.
- D. ASTM D4945 - Standard Test Method for High-Strain Dynamic Testing of Deep Foundations 2017.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate test method and equipment, load type, calibration equipment.
- C. Designer Qualification Statement.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Provide equipment, load carrying devices, loads, and instrumentation as required by test methods specified in PART 3.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify site conditions will support cribbing and load for testing purposes.

3.02 PREPARATION

- A. Establish stable working elevation for test equipment.

3.03 TESTING

- A. Load test the following:
 - 1. One pile in first 100 piles.
- B. Perform the following tests on each test pile:
 - 1. Subject piles to 1-3/4 times design load.
- C. Acceptable Permanent Set of Piles After Load Testing: 1/8 inch.
- D. If tested piles do not comply with requirements, perform additional testing of other piles.

3.04 FIELD QUALITY CONTROL

- A. Field inspection and monitoring of testing will be performed under provisions of Section 014000.
- B. Document test equipment used, method of calibration and recording, test results, recommendations or modification of piling method used.
- C. Accurately record actual dimensions and locations of tested piles and movement or distortion caused by testing.

3.05 EQUIPMENT REMOVAL

- A. Remove test and temporary load equipment from site.

END OF SECTION

**SECTION 31 10 00
SITE CLEARING**

PART 1 GENERAL

1.01 SUMMARY

- A. The following sections contain requirements that relate to this section:
 - 1. Section 02 32 00 - Geotechnical Investigation
 - 2. Section 31 25 00 - Erosion Control

1.02 REFERENCES

- A. Where reference is made to the "Construction Standards", it shall be construed to mean the City of Madison's Standard Specifications for Public Works Improvements.
- B. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the "Geotechnical Report", it shall be construed to mean the Geotechnical Report provided in Section 02 32 00 - Geotechnical Investigation.

1.03 DEFINITIONS

- A. Clearing:
 - 1. Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, and rubbish occurring in the areas to be cleared.
- B. Grubbing:
 - 1. Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas.

1.04 SUBMITTALS

- A. The following shall be submitted:
 - 1. Written permission to dispose of such products on private property shall be filed with the Owner's Construction Representative.
 - 2. Submit documentation from the disposal facility to verify that it is licensed to accept the material.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 CLEARING

- A. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing.
- B. Trees designated to be left standing within the cleared areas shall be trimmed of dead branches 1½ inches or more in diameter and shall be trimmed of all branches below the heights indicated or directed.
 - 1. Limbs and branches to be trimmed shall be neatly cut close to the bole of the tree or main branches.

2. Cuts more than 1½ inches in diameter shall be painted with an approved tree-wound paint.
 3. Trees and vegetation to be left standing shall be protected from damage incidental to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.
- C. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work.
- D. Disposal of Elm and Ash trees, roots, or branches shall be in accordance with local and state regulations.

3.02 GRUBBING

- A. Remove material to be grubbed, together with logs and other organic or metallic debris not suitable for roadway construction in accordance with Section 201.3 of the State Specifications, except the minimum depths for removal shall be as follows:
1. In cut areas, 18 inches below final subgrade.
 2. In embankments areas, 18 inches below the existing grade.
- B. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform to the proposed surface of the ground.
- C. Burning or burying as a means of disposal is prohibited.

3.03 TREE REMOVAL

- A. Where indicated or directed, individual trees and stumps that are designated shall be removed from areas outside those areas designated for clearing and grubbing.
- B. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING.
- C. Dispose of materials as specified in paragraph CLEAN UP.

3.04 TOPSOIL

- A. Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material. Refer to Section 32 91 19 - Topsoil-Select Fill Materials and Application for further information.
1. Strip topsoil to whatever depths encountered in a manner to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.
 2. Stockpile topsoil in storage piles in areas indicated or directed. Construct storage piles to provide free drainage of surface water.

3.05 CLEAN UP

- A. Logs, stumps, roots, brush, rotten wood, and other refuse from the clearing and grubbing operations, shall be disposed of outside the limits of the project at the Contractor's responsibility, except when otherwise approved in writing
- B. All waste and debris shall be disposed of in compliance with state and local regulations within five days of being cut or removed.
- C. Disposal of Elm and Ash trees shall be in accordance with local regulations.
- D. Submit the location of any disposal facility located outside the limits of the project to the Owner's Construction Representative prior to removal from the project site.
- E. Submit documentation from the disposal facility to verify that it is licensed to accept the material.

- F. No material shall be removed from the project site without prior approval from the Owner's Construction Representative.
- G. Burning or burying as a means of disposal is prohibited.

END OF SECTION

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**SECTION 31 13 16
TREE PROTECTION**

PART 1 GENERAL

1.01 SCOPE

- A. These specifications include the protection and trimming of existing trees that interfere with, or are affected by execution of the Work, whether temporary or permanent construction related sections.

1.02 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section:
 - 1. Section 31 10 00 – Site Clearing
 - 2. Section 31 20 00 – Earthmoving
 - 3. Section 31 25 00 – Erosion Control
 - 4. Section 32 91 19 – Topsoil-Select Fill Materials and Application

1.03 DEFINITIONS

- A. Tree Protection Zone: Area surrounding individual trees or groups of trees to remain during construction, and defined by the area encompassing 1.5 times the tree caliper at 4.5 feet above the ground or the perimeter drip line unless otherwise indicated by arborist.

1.04 REFERENCE STANDARDS

- A. *American Standards for Nursery Stock, ANSI Z60.1*, current edition. American Association of Nurserymen, Inc.
- B. *Standardized Plant Names, Second Edition* (1942). American Joint Committee on Horticulture Nomenclature, Horace McFarland Company, Harrisburg, PA.
- C. *American National Standard for Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance-Standard Practices, ANSI A300*, current edition.

1.05 QUALITY ASSURANCE

- A. An experienced tree service firm that has successfully completed tree protection similar to that required for this Project.
- B. Pre-installation Conference: Conduct conference at Project site to comply with requirements and to identify boundary of tree protection fencing.

1.06 PLANTING SCHEDULE

- A. All plants shall be guaranteed to be in healthy and flourishing condition for one full year after installation and acceptance by the Owner.
- B. Plants not thriving shall be replaced at no cost to the Owner. The Contractor may suggest substitutions for replacement plants.
- C. Replacement plants shall be guaranteed for one year after installation.
- D. At any time during the guarantee period, the Contractor shall remove or replace, without cost to the Owner and within a specified planting period, all plants not in a healthy and flourish conditions as determined by the Owner.

1.07 MAINTENANCE

- A. The Contractor shall maintain plantings and lawn for at least a period of 30 days, or until final acceptance from the Owner. The Contractor is responsible for adequately watering plants and lawn during this 30-day period.
- B. Fertilizing: Any and all chemical applications are to be performed in accordance with current federal, state, and local laws, through EPA-registered materials and application techniques, and performed under the supervision of a licensed certified applicator. Apply fertilizer to planted areas at the specified rate, and as per manufacturer's recommendations.

- C. Watering: All plant materials installed under the contract shall be watered within the first 24 hours of initial planting and not less than twice weekly until final acceptance by Owner. Water used shall be of sufficient quality for irrigation and free of materials harmful to plant growth.
- D. Pesticide: Any use of pesticides during the contracted maintenance period, as determined by the Owner, shall utilize the minimum amount of approved pesticide needed to control pests on plant materials installed under the contract. Pesticide applications are to be performed in accordance with current federal, state and local laws, through EPA-registered materials and application techniques, and performed under the supervision of a licensed certified applicator. Apply at the specified rate, and as per manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Mulch: Shredded hardwood bark mulch, free of material detrimental to healthy plant growth. Mulch shall be finely shredded, weed free, and dye-free.
- B. Topsoil: Refer to Topsoil-Select Fill Materials and Application section.

PART 3 EXECUTION

3.01 PREPARATION

- A. Temporary Fencing: Install temporary fencing around tree protection zones to protect trees identified on plan that have been indicated as existing trees to remain. Temporary fencing shall be installed around dripline as much as possible. Maintain temporary fence and remove when construction is complete.
- B. Protect the root systems of existing trees to remain from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- C. Mulch areas inside tree protection zones and within drip line of trees to remain and other areas indicated.
- D. Apply 2-inch average thickness of mulch. Do not place mulch within 6 inches of tree trunks.
- E. Do not store construction materials, debris, or excavated material inside protection zones. Do not permit vehicles or foot traffic within tree protection zones; prevent soil compaction over root systems. Do not allow fill on trees roots inside the tree protection zone. **Note:** As little as 2 inches can have deleterious long-term effects on tree health. If fill or grade changes must occur, a serious look at whether or not the tree should be left must occur.
- F. Maintain tree protection zones free of weeds and trash.
- G. Do not allow fires within tree protection zone.

3.02 EXCAVATION

- A. Install shoring or other protective support systems to minimize sloping or benching of excavations.
- B. Do not excavate within tree protection zones unless necessary to install stormwater management facilities. If excavation is required, temporary fencing shall be adjusted to the furthest extent of grading away from the trunk.
- C. Where excavation for new construction is required within tree protection zones, hand clear and excavate to minimize damage to root systems. Cut roots in the area to be excavated with a saw to ensure a clean cut. Torn or ripped roots must be trimmed.
- D. Redirect roots in backfill areas where possible. **Note:** If encountering large, main lateral roots, an assessment of future tree stability must be made. Expose roots beyond excavation limits as required to bed and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction.

- E. Do not allow exposed roots to dry out before placing permanent backfill. Provide a temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
- F. Where utility trenches are required within tree protection zones, tunnel under or around roots by drilling auger boring, pipe jacking, or digging by hand.
- G. Root Pruning: Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots with sharp pruning instruments, do not break or chop.

3.03 REGRADING

- A. Grade Lowering: Where new finish grade is indicated below existing grade around trees, slope grade away beyond tree protection zones. Maintain existing grades within tree protection zones.
- B. Root Pruning: Prune tree roots exposed during grade lowering. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots with sharp pruning instruments; do not break or chop.
- C. Minor Fill: Where existing grade is 1 inch or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.04 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted.
- B. Disposal: Remove excess excavated material and displaced trees from Owner's property.

END OF SECTION

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**SECTION 31 20 00
EARTHMOVING**

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Stripping of topsoil and stockpiling.
 - 2. Excavation, preparation, backfilling, and compaction of subgrades per the Geotechnical Report.
 - 3. Cutting, filling, grading, and compaction for drives, walks, roads, and parking subgrade.
 - 4. Cutting, filling, grading, and compaction for landscaping area subgrade ready for topsoil.

1.02 RELATED WORK

- A. The following sections contain requirements that relate to this section:
 - 1. Section 31 10 00 - Site Clearing
 - 2. Section 31 25 00 - Erosion Control

1.03 STANDARD SPECIFICATIONS

- A. Where reference is made to the "Construction Standards", it shall be construed to mean the City of Madison's Construction Standards, as they may pertain, except the method of measurement and basis of payment shall not apply.
- B. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the "Geotechnical Report", it shall be construed to mean the geotechnical report in Section 02 32 00.
- E. All construction of public facilities and/or work within public lands or rights of way shall conform to the requirements and conditions of the Standard Specifications stated above with the most stringent applying.
- F. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
 - 1. ASTM International (ASTM):

ASTM D422	Particle Size Analysis of Soil
ASTM D698	Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft ³ (600 kN.m/m ³))
ASTM D1557	Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft ³ (2,700 Kn.m/m ³))
ASTM D2487	Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D2488	Description and Identification of Soils (Visual-Manual Procedures)
ASTM D4318	Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D6938	In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
 - 2. American Association of State Highway and Transportation Officials (AASHTO):

AASHTO T 88	Particle Size Analysis of Soils
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3. National Fire Protection Association (NFPA):
NFPA 70 National Electrical Code
4. American Water Works Association (AWWA):
AWWA C200 Standard for Steel Water Pipe - 6 In. (150 mm) and Larger
AWWA C206 Field Welding of Steel Water Pipe

1.04 SUBMITTALS

- A. Submit documentation of materials meeting the required specifications.
- B. Testing:
 1. The City shall provide testing for work performed for public improvements.
 2. The Contractor shall provide quality control testing as defined in the Contract Documents.
 3. The Contractor shall coordinate work and testing requirements with the Owner's Construction Representative and City's testing agency.

1.05 DEFINITIONS

- A. Backfill: Soil materials used to fill an excavation.
- B. Base Course: Course placed between the sub-grade and the hot-mix asphalt, concrete pavement, walks, or curbs.
- C. Breaker Run Stone: Meet the requirements defined in Wisconsin Department of Transportation (WisDOT) Section 311.
- D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- E. Excavation: Removal of material encountered above the subgrade elevations and to lines and dimensions indicated.
 1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Owner's Construction Representative. Authorized additional excavation and replacement material will be paid for according to Contract provisions.
 2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction of Owner's Construction Representative. Unauthorized excavation, as well as remedial work directed by the Owner's Construction Representative, shall be without additional compensation.
- F. Fill: Soil materials used to raise existing grades.
- G. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- H. Topsoil: Excavated on-site material, free of large tree roots, rocks, subsoil, debris, and weeds.

1.06 CONTOURS (GRADE ELEVATIONS)

- A. Contours indicated on Drawings are the finished grade elevations. Contractor shall review all grade elevations before commencing to ensure that proper slopes for drainage, slope for drives, walks, paving, etc., are maintained. If Contractor believes a deficiency is apparent, they shall notify the City and Owner's Construction Representative for clarification.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

- A. General: All materials shall conform to requirements of the Geotechnical Report.
- B. Materials:
 1. Fill and Backfill. Satisfactory materials excavated from the site.
 2. Imported Fill Material: Satisfactory material provided from off-site borrow areas when sufficient satisfactory materials are not available from required excavations.
 3. Trench Backfill: ASTM D2321 and the Standard Specifications, unless otherwise specified or shown on the Drawings.

4. Subgrade Sub-base Material: As required by the Geotechnical Report and/or Section 31 22 16.15.
 5. Building Sub-base Material: Sub-base for building and appurtenances slabs on ground is specified in Section 03 30 00 or the Geotechnical Report as applicable.
 6. Bedding: Aggregate type as indicated on the plans or naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100% passing a 1-inch sieve and not more than 8% passing a No. 200 sieve.
 7. Drainage Fill: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASTM D448; coarse-aggregate grading Size 57; with 100% passing a 1½-inch sieve and 0% to 5% passing a No. 8 sieve.
 8. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D448; coarse-aggregate grading Size 67; with 100% passing a 1-inch sieve and 0% to 5% passing a No. 4 sieve.
 9. Topsoil: Topsoil shall consist of stripping material excavated from the site. Topsoil shall consist of organic surficial soil found in depth of not more than 6 inches. Topsoil shall be as further defined in Section 32 91 19 - Topsoil-Select Fill Materials and Application.
- C. Where conflicts between this specification, the Drawings, and the Geotechnical Report exist, requirements of the Geotechnical Report shall govern.
- D. Source Quality Control:
1. Laboratory testing of off-site materials proposed for use in the project shall be provided by the Contractor's testing consultant. Test results shall be provided to the Owner's Construction Representative for approval before incorporation into the work.
 2. The following tests shall be performed on each type of imported soil material used as compacted fill:
 - a. Moisture and Density Relationship: ASTM D698 or ASTM D1557
 - b. Mechanical Analysis: AASHTO T88 or ASTM D422
 - c. Plasticity Index: ASTM D4318

PART 3 EXECUTION

3.01 GENERAL

- A. General: All work shall be executed and conform to requirements of the Geotechnical Report.
1. Where conflicts between this specification and the Geotechnical Report exist, requirements of the Geotechnical Report shall govern.
 2. For any material provided by the Owner, the Contractor shall provide a minimum of five days' notice for the material and shall include the quantity of material and delivery location requested for each day. Delivered material shall be available Monday-Friday 7:00 a.m. to 3:30 p.m. unless otherwise agreed upon by both the Owner and Contractor."

3.02 PREPARATION

- A. Subgrades, fill material, and grading for pavement, ramps, sidewalks, and structures shall conform to the recommendations in the Geotechnical Report.
- B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- C. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- D. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.03 CLEARING AND GRUBBING

- A. Limits of clearing and grubbing shall be areas which are affected by excavation and grading.
1. Refer to Section 31 10 00 - Site Clearing

- C. Remove trees, stumps, roots, brush, other vegetation, debris, existing foundations, pavements, fences, and other items which interfere with new construction.
- D. Remove stumps, logs, roots, and other organic material including existing structure occurring outside the structure excavation to depths below the following:
 - 1. Walks: 18 inches
 - 2. Roads and Drives: 18 inches
 - 3. Parking Areas: 36 inches
 - 4. Lawn Areas: 12 inches
 - 5. Concrete Pads: 24 inches
 - 6. Depressions within areas shall be filled and compacted as specified under Controlled Backfill.
- E. Removal of existing trees which are to remain will not be permitted. Notify Owner's Construction Representative if existing trees create a difficulty when grades are raised or lowered in excess of 6 inches.

3.04 DEWATERING

- A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. All dewatering activities must meet all the requirements set forth in the Wisconsin Department of Natural Resources (WDNR) Construction Site Erosion & Sediment Control Technical Standard 1061. The Contractor shall obtain any necessary permits for dewatering.
- C. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation:
 - 1. Reroute surface water runoff away from excavated areas.
 - a. Do not allow water to accumulate in excavations.
 - b. Do not use excavated trenches as temporary drainage ditches.
 - 2. Install a dewatering system to keep subgrades dry and convey groundwater away from excavations. Maintain until dewatering is no longer required.
- D. Provide dewatering systems as required for excavations:
 - 1. Design and provide dewatering system using accepted and professional methods consistent with current industry practice to eliminate water entering the excavation under hydrostatic head from the bottom or sides. Design system to prevent differential hydrostatic head, which would result in floating out soil particles in a manner, termed as a "quick" or "boiling" condition. System shall not be dependent solely upon sumps or pumping water from within the excavation where differential head would result in a quick condition, which would continue to worsen the integrity of the excavation's stability.
 - 2. Provide dewatering system of sufficient size and capacity to prevent ground and surface water flow into the excavation and to allow Work to be installed in a dry condition.
 - 3. Control, by acceptable means, all water regardless of source. The Contractor shall be responsible for disposal of the water.
 - 4. Control groundwater in a manner that preserves strength of foundation soils, does not cause instability or raveling of excavation slopes, and does not result in damage to existing structures. Where necessary, lower water level in advance of excavation utilizing wells, well points, jet educators, or similar positive methods. The water level as measured by piezometers shall be maintained a minimum of 3 feet below prevailing excavation level.
 - 5. Commence dewatering prior to any appearance of water in excavation and continue until Work is complete to the extent that no damage results from hydrostatic pressure, flotation, or other causes.
 - 6. Open pumping with sumps and ditches will be allowed provided it does not result in boils, loss of fines, softening of the ground, or instability of slopes.
 - 7. Install wells or well points, if required, with suitable screens and filters so that continuous pumping of fines does not occur. Arrange discharge to facilitate collection of samples by

the Owner or municipal agencies. During normal pumping and upon development of wells, levels of fine sand or silt in the discharge water shall meet WDNR discharge standards.

8. Control grading around excavations to prevent surface water from flowing into excavation areas.
 9. Designate and obtain the services of a qualified dewatering specialist to provide dewatering plan as may be necessary to complete the Work.
 10. Contractor shall be responsible for the accuracy of the Drawings, design data, and operational records required.
 11. Contractor shall be responsible for the design, installation, operation, maintenance, and any failure of any component of the system.
- E. Maintaining Excavation in Dewatering Condition:
1. Dewatering shall be a continuous operation. Interruptions due to power outages or any other reason will not be permitted.
 2. Continuously maintain excavation in a dry condition with positive dewatering methods during preparation of subgrade, installation of pipe, and construction of structures until the critical period of construction or backfill is completed to prevent damage of subgrade support, piping, structure, side slopes, or adjacent facilities from flotation or other hydrostatic pressure imbalance.
 3. Provide standby equipment on site, installed, wired, and available for immediate operation if required to maintain dewatering on a continuous basis in the event any part of the system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, perform such work as may be required to restore damaged structures and foundation soils at no additional cost to the Owner.
 4. System maintenance shall include but not be limited to 24-hour supervision by personnel skilled in the operation, maintenance, and replacement of system components and any other work required to maintain excavation in dewatered condition.

3.05 EXPLOSIVES

- A. Blasting of materials classified as rock shall be permitted only when authorized by the Owner's Construction Representative and municipality. Contractor shall meet all federal, state, and local requirements
- B. Blasting shall be done with explosives of quantity and power, and fired in such sequence and locations as to not injure personnel, damage or crack rock against which concrete is to be placed, damage property, or damage existing work or other portions of new work. Contractor shall be responsible for damage caused by blasting operations.
- C. The Contractor shall submit a Blasting Plan, prepared and sealed by a registered professional engineer that includes calculations for overpressure and debris hazard. Blasting mats shall be provided and non-electric blasting caps shall be used. The Contractor shall obtain written approval prior to performing any blasting and shall notify the Owner's Construction Representative a minimum of 24 hours prior to blasting. The plan shall contain provisions for storing, handling and transporting explosives as well as for the blasting operations.

30.6 STRIPPING OF SITE

- A. Strip the site in conformance with the requirements of the Geotechnical Report referenced in Section 02 32 00.
- B. Strip those portions of the site which will occupy walks, roads, drives, parking areas and where grade changes are to be made, by a minimum of depth of topsoil indicated by the soils report plus additional soil as required to reach soil free of roots or organic debris subject to rotting and settling.
- C. Stockpile reusable topsoil for use in finish grading and restoration. Reusable topsoil shall be fertile, friable agricultural soil capable of sustaining vigorous plant growth and suitable for growth of grass, neither excessively alkaline or acidic, free from subsoil, clay lumps, gravel, brush, objectionable weeds, litter, stones larger than 1 inch in diameter, and other material. Do

not permit surplus topsoil to leave the project site until the finish grading is nearing completion or unless otherwise approved in writing by the Owner's Construction Representative.

- D. Do not excavate, grade, or work topsoil in frozen or muddy conditions.

3.07 ROCK IN EXCAVATIONS

- A. When rock as defined above is encountered before the proper subgrade is reached, work shall proceed as follows:
1. The excavation shall stop at this point and it shall be determined if such material is classified as rock.
 2. Material classified as rock shall be removed to the lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - a. 24 inches outside of concrete forms.
 - b. 6 inches outside of minimum required dimensions of concrete cast against grade.
 - c. 6 inches beneath the bottom of concrete slabs on grade.

3.08 UTILITY ROCK EXCAVATIONS

- A. When rock as defined above is encountered when excavating for water main or storm sewer, work shall proceed as follows:
1. The excavation shall stop at this point and it shall be determined if such material is classified as rock.
 2. Material classified as rock shall be removed to 6 inches below the proposed utility location to permit installation of the utility without exceeding the following dimensions:
 - a. 8 feet in width centered on the proposed utility.
 - b. 6 inches beneath the bottom of the proposed water main or storm sewer.
 - c. Utility rock excavations shall be completed in accordance with Section 608 of the State Specifications.

3.09 EXCAVATION FOR WALKS AND PAVEMENTS

- A. Excavations shall be in conformance with the requirements of the Geotechnical Report referenced in Section 02 32 00.
- B. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.10 SUBGRADE INSPECTION

- A. Notify Owner's Construction Representative when excavations have reached subgrade.
- B. If Owner's Construction Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Proof-roll shall be completed in accordance with Geotechnical Report referenced in Section 02 32 00 and in accordance with Section 31 22 16.15 - Subgrade Preparation.
- D. Authorized additional excavation and replacement material will be paid for according to the Contract provisions.
- E. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Owner's Construction Representative, without additional compensation from the Owner.

3.11 STORAGE OF SOIL MATERIALS

- A. Stockpile borrow materials and satisfactory excavated soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Provide necessary erosion control devices as shown on the Erosion Control Plan.
1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.12 BACKFILL

- A. Backfill shall be in conformance with the requirements of the Geotechnical Report referenced in Section 02 32 00.
- B. Place and compact backfill in excavations promptly, but not before completing the following:
 - 1. Removing trash and debris.
 - 2. Removing deleterious materials.

3.13 FILL

- A. Preparation: Remove vegetation, topsoil, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface before placing fills.
- B. Plow, scarify, bench, or break up sloped surfaces steeper than one vertical to four horizontal so fill material will bond with existing material.
- C. Place and compact fill material in layers to required elevations per the Geotechnical Report.
- D. Fill areas to contours and elevations shown on the Drawings with materials deemed satisfactory.
- E. Place fills in continuous lifts specified herein.
- F. Fill within proposed building subgrade, paving subgrade, and outparcel subgrades shall not contain rock or stone greater than 6 inches in any dimension.
- G. Unless otherwise specified for rock fill, rock or stone less than 12 inches in largest dimension may be used in fill below structures, paving, outparcels, and graded areas, up to 24 inches below surface of proposed subgrade of hard surface paved areas or 24 inches below finish grade of landscape and turf graded areas when mixed with satisfactory material. Rock or stone less than 4 inches in largest dimension may be used in fill within the upper 24 inches of proposed subgrade or finish grade of graded areas when mixed with satisfactory material.
- H. Rocks larger than 12 inches in diameter shall be separated and stockpiled at an onsite location determined by the Owner's Construction Representative.
- I. Fill materials used in preparation of subgrade shall be placed in lifts or layers not to exceed 12 inches.

3.14 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2% of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
 - 2. Remove and replace, or scarify and air-dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2% and is too wet to compact to specified dry unit weight.

3.15 COMPACTION OF BACKFILLS AND FILLS

- A. Place backfill and fill materials in layers not more than 8 inches (200 mm) in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches (100 mm) in loose depth for material compacted by hand-operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact as follows:

Percent (%) of Maximum Laboratory Density

<u>Location</u>	<u>ASTM D698</u>	<u>ASTM D1557</u>
Subgrade and fill below foundations, slab-on-grade, and upper 12 inches of area to be paved	98	95
Subgrade and fill in all other areas	95	92

- D. Maintain moisture content of not less than 1% below and not more than 2% above optimum moisture content of fill materials to attain required compaction density.
- E. Exercise proper caution when compacting immediately over top of pipes or conduits. Water jetting or flooding is not permitted as method of compaction.
- F. Corrective Measures for Non-Complying Compaction: Remove and re-compact deficient areas until proper compaction is obtained.

3.16 FINISH GRADING

- A. Grade areas where finish grade elevations or contours are indicated on the Drawings, other than paved areas, outparcels, and buildings, including excavated areas, filled and transition areas, and landscaped areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Ground surfaces shall vary uniformly between indicated elevations. Grade finished ditches to allow for proper drainage without ponding and in manner that will minimize erosion potential. For topsoil, sodding, and seeding requirements refer to Section 32 92 00 and Section 32 92 19.
- B. Correct settled and eroded areas within one year after date of completion at no additional expense to the Owner. Bring grades to proper elevation.

3.17 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - 1. Provide a smooth transition between adjacent existing grades and new grades.
 - 2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: ± 1 inch
 - 2. Walks: ± 1 inch
 - 3. Pavements: $\pm 1/2$ inch

3.18 MAINTENANCE OF SUBGRADE

- A. Verify finished subgrades to ensure proper elevation and conditions prior to construction above subgrade.
- B. Protect subgrade from excessive wheel loading during construction, including concrete trucks, dump trucks, and other construction equipment. If rutting or damage to the subgrade does occur, regrade and compact to project specified tolerances.
- C. Construct temporary ditches and perform such grading as necessary to maintain positive drainage away from subgrade at all times. Contractor shall be responsible for maintaining grades and subgrades throughout construction from frost, moisture and excessive wheel loading. Contractor shall be responsible for choosing means, methods and best management practices to protect the subgrade.

3.19 BORROW AND SPOIL SITES

- A. Comply with WPDES and local erosion control permitting requirements for any and all on-site and off-site, disturbed spoil and borrow areas. Upon completion of spoil or borrow operations, clean up spoil or borrow areas in a neat and reasonable manner to the satisfaction of the Developer or off-site property owner, if applicable.
- B. Topsoil stripping and re-spread will be paid for at the quantity and unit price noted on the Bid Form. Excavation shall be paid as part of the Lump Sum price for Excavation Common as noted on the Bid Form. Seeding and mulching shall also be paid at the unit prices noted in the Bid Form.

3.20 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace soil material to depth as directed by Owner's Construction Representative; reshape and recompact.
- C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.21 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off Owner's property.

3.22 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Owner's Construction Representative. Except for specified mandatory testing, field quality control testing and inspection shall be at the discretion of the Contractor as necessary to assure compliance with Contract requirements.
- B. The Owner's testing agency will perform retesting and re-inspection as necessary until corrections are fully completed by the Contractor at the Contractor's expense.

END OF SECTION

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**SECTION 31 22 16.15
SUBGRADE PREPARATION**

PART 1 GENERAL**1.01 SCOPE**

- A. The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to complete roadway and parking lot grading, as required in these specifications, on the Drawings and as otherwise deemed necessary to complete the work.

1.02 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section:
1. Section 02 32 00 - Geotechnical Investigation
 2. Section 31 25 00 - Erosion Control
 3. Section 31 23 16.13 - Trenching
 4. Section 31 20 00 - Earthmoving
 5. Section 31 32 00 - Soil Stabilization

1.03 QUALITY ASSURANCE

- A. The Contractor shall retain the services of a geotechnical consulting engineer to conduct sampling testing and analysis as required by this section and elsewhere in the Contract Documents. The geotechnical consulting engineer shall meet the requirements of ASTM E329-00b.

Material	Test Required	Test/Sample Frequency
Granular Fill	D422-63(1998) - Standard Test Method for Particle Size Analysis of Soils	1 test/500 cy placed
Granular Fill	ASTM D1557 - Optimum Moisture-Maximum Density Determination (Modified Proctor)	1 test per type of material

Table 31 22 16.15 - 1

1.04 REFERENCES

- A. Where reference is made to the "Construction Standards", it shall be construed to mean the City of Madison's Construction Standards, except the method of measurement and basis of payment shall not apply.
- B. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the "Geotechnical Report", it shall be construed to mean the Geotechnical Report in Section 02 32 00.
- E. ASTM International (ASTM):
1. ASTM D698 – Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbs/ft³ (600 kN-m/m³)).
 2. ASTM D1557 – Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbs/ft³ (2,700 kN-m/m³)).

3. ASTM D6938 – In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.05 PERMITS/FEES

- A. Contractor shall be solely responsible for obtaining all permits necessary to complete the work that are not provided by the Owner. Contractor shall pay all fees associated with obtaining permits. These include, but are not limited to, permits for work within public right-of-way, and building permits.
- B. The Owner will obtain and provide the WDNR WRAPP permit, City's Erosion Control and Stormwater permits, and Wisconsin Department of Safety and Professional Services (WDSPS) Exterior Plumbing permit.

1.06 PROVISIONS FOR FUTURE WORK

- A. None.

1.07 SURVEY AND STAKING

- A. Owner will provide benchmarks and control points for the project as defined in Division 1.
- B. Contractor shall be responsible for transferring benchmarks, control points, lines, and grades as necessary to complete his work.

PART 2 MATERIALS

2.01 AGGREGATE MATERIALS - GENERAL

- A. Alternate crushed aggregate material blends that are locally available will be considered on a project-by-project basis for crushed aggregate base courses and will be subject to the City's approval. The Owner's Construction Representative will require the Contractor to furnish a gradation report on the materials.

2.02 SPECIAL FILL

- A. In certain cases, special fill materials may be required for specific purposes, such as stabilizing subgrades, backfilling, undercut excavations or filling behind retaining walls. Fill materials shall meet the requirements of the following sections of the State Specifications: Section 209 for Granular Backfill, Section 210 for Structure Backfill, Section 305 for Dense Graded Base Course, Section 312 for Select Crushed Material, and Section 311 for Breaker Run of the State Specifications.

2.03 GEOTEXTILE FABRIC

- A. See Section 31 32 00 - Soil Stabilization.

PART 3 EXECUTION

3.01 PREPARATION

- A. Review plans and prepare work plan and schedule. Coordinate any necessary interruptions in site access with Owner's Construction Representative, in accordance with other specification sections.
- B. Contact Diggers Hotline. Locate and protect utilities, structures, pavement, trees, landscaping, benchmarks, and other features in the work area.
- C. Layout work. Establish and transfer line and grade as necessary to complete the work.
- D. Remove topsoil from work area. Sawcut and remove pavement from work area.
- E. Grade roadways and parking areas to drain water away.

3.02 PREPARE FOUNDATION FOR ASPHALTIC PAVEMENT

- A. Provide all labor, materials, and equipment necessary to prepare the foundation for to a condition suitable for constructing and supporting asphaltic pavement in accordance with these Specifications and Section 211 of the State Specifications.

3.03 EXCAVATION

- A. Excavate to elevations and dimensions as shown on the Drawings and as necessary to complete construction. Excavations shall be sufficiently deep to provide for all proposed base course and pavement.
- B. Notify the Owner's Construction Representative if correction of unauthorized excavation or over-excavation is necessary. Said excavations will be corrected based on recommendations of the Owner's Construction Representative or Owner's Geotechnical Consultant. Contractor will be responsible for all costs associated with correcting these excavations, including fees charged by the City and/or Owner's Geotechnical Consultant.
- C. Segregate the various materials excavated. Reserve material meeting the requirements of backfill for the location. Excavated material that does not meet the requirements of backfill, and excess excavated material, shall be removed from the site and disposed by the contractor, unless directed otherwise by other specification sections or the Owner's Construction Representative.
- D. Locate spoil piles in accordance with OSHA requirements, and so that it does not interfere with public travel, adjacent landowners or other construction activities.

3.04 FILL AND COMPACTION

- A. Excavation shall be reasonably free of water prior to beginning filling. Do not place material on frozen surfaces or use frozen material.
- B. Fill areas using the material specified on Table 31 22 16.15 - 2, or as shown on the Drawings.
- C. Place and compact material to minimize settlement and avoid damage to structures, pipes, utility lines and other features. Hand-place and compact material as necessary.
- D. Place backfill simultaneously on both sides of structures.
- E. Moisture condition backfill material as necessary to achieve density required for given use.
- F. Compact fill material as required by Table 31 22 16.15 - 2 for the given use. Compaction requirements based on Modified Proctor Dry Density (ASTM D1557).
- G. It is the responsibility of the Contractor to provide all necessary compaction equipment and other grading equipment that may be required to obtain the specified density. Vibratory plate or tamping type walk behind compactors will be required whenever backfill is placed adjacent to structures, pipes, utility lines confined spaces (i.e., backfilling undercut areas) and other features.

Area	Percent (%) Compaction (1)	
	Clay/Silt	Sand/Gravel
<u>Within 10 feet of building lines</u>		
Under steps and walks	95	95
<u>Beyond 10 feet of building lines</u>		
Under walks and pavements - Granular Fill:		
- Less than 2 feet below subgrade	95	95
- Greater than 2 feet below subgrade	92	92

Table 31 22 16.15 - 2

- H. Where additional filling or excavation is necessary, or placement of base course will be delayed, roll surface of proposed roadway with a smooth drum roller to provide relatively impervious surface and promote drainage. Roll with a smooth single drum vibratory roller having a minimum operating static weight of 12,000 pounds and a minimum centrifugal force of 22,000 pounds to provide relatively impervious surface and promote drainage. In the event the material is deficient in moisture content for readily obtaining the necessary density, it shall be moistened to the degree necessary by means of approved equipment. The compaction

operation shall continue until the Engineer observes no visible displacement of material laterally or longitudinally under the compaction equipment or hauling equipment.

3.05 SUBGRADE APPROVAL/PROOF-ROLLING

- A. Prior to undercutting or excavating below subgrade (EBS) or placing any base course, contact the Owner's Construction Representative to schedule inspection of subgrade and proof-rolling. Provide minimum of 24 hours confirmed notice. All proof-rolling shall be completed in the presence of the Owner's Construction Representative or Owner's Geotechnical Consultant.
- B. To complete proof-rolling, entire roadway subgrade shall be provided with a relatively smooth surface, suitable for observing soil reaction during proof-rolling.
- C. Contractor shall schedule and provide a fully loaded tri-axle dump truck for proof-rolling. Loaded truck shall have a minimum gross operating weight of 30 tons. Test shall be conducted with "tag" or "pusher" axles retracted from the ground.
- D. Test rolling shall be accomplished in a series of traverses parallel to the centerline of the street or parking area. The truck shall traverse the length of the street or parking area once for each 12 feet of width. Additional passes along the traverse shall be completed as directed by the Owner's Construction Representative, to further define unsatisfactory subgrade.
- E. Soft areas, yielding areas, cracked areas or areas where rolling or wave action is observed shall be considered indicative of an unsatisfactory subgrade. Such areas shall be undercut as outlined in subsequent subsections of this specification.
- F. Once the subgrade has been proof-rolled and approved, protect the soils from becoming saturated, frozen, or adversely altered.

3.06 UNDERCUTTING/EXCAVATION BELOW SUBGRADE (EBS)

- A. Undercutting/EBS shall be completed only when directed by the Owner's Construction Representative. The Contractor shall not be compensated for any unauthorized undercutting/EBS. Measure and document undercut areas and depths in consultation with Owner's Construction Representative.
- B. Payment for undercutting/EBS shall be made on a unit price (cubic yard) basis measured in place at the rate as defined in the Contract. Payment will be made only for the measured quantity of undercutting/EBS directed by the Owner's Construction Representative to be performed. The unit price shall include all costs for labor and materials necessary to remove and replace undercut areas including providing backfill materials and disposal of excavated materials off site.
- C. Excavate undercut areas to the depth specified using equipment with smooth cutting edge. Excavated undercut material that does not meet the specifications for fill needed elsewhere on site shall be removed from the site and legally disposed.
- D. Undercut areas shall be backfilled with 3-inch dense graded base course, as directed by the Owner's Construction Representative in maximum of 6-inch thick lifts (compacted) or as directed by the Owner's Construction Representative. Three-inch dense graded base course shall be compacted in thin lifts with a vibratory compactor until no further consolidation is evident.

3.07 GEOTEXTILE FABRIC

- A. When required by the Owner's Construction Representative geotextile fabric shall be installed over the subgrade layer and prior to installing base aggregates. The Owner's Construction Representative shall determine if geotextile fabric installation is required at the time of subgrade proof-rolling.

END OF SECTION

SECTION 312316 EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures, and utilities within the building.
- B. Trenching for utilities outside the building to utility main connections.
- C. Temporary excavation support and protection systems.

1.02 RELATED REQUIREMENTS

- A. Section 015713 - Temporary Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.
- C. Section 312200 - Grading: Grading.
- D. Section 312323 - Fill: Fill materials, backfilling, and compacting.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - Safety and Health Regulations for Construction Current Edition.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Temporary Support and Excavation Protection Plan.
- C. Project Record Documents: Record drawings at project closeout according to 017000 - Execution and Closeout Requirements. Show locations of installed support materials left in place, including referenced locations and depths, on drawings.
- D. Shoring Installer's Qualification Statement.
- E. Field Quality Control Submittals: Document visual inspection of load-bearing excavated surfaces.

1.05 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.

- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.06 QUALITY ASSURANCE

- A. Temporary Support and Excavation Protection Plan:

PART 2 PRODUCTS

2.01 MATERIALS

- A. Bedding and Fill to Correct Over-Excavation:
 - 1. See Section 312323 for bedding and corrective fill materials at general excavations.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey bench mark and intended elevations for the work are as indicated.
- B. Survey existing adjacent structures and improvements and establish exact elevations at fixed points to act as benchmarks.
 - 1. Resurvey benchmarks during installation of excavation support and protection systems and notify Owner if any changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.
- C. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed by Architect. If the proposed excavation extends more than 1 foot into the prevailing groundwater, control groundwater intrusion with a comprehensive dewatering procedures, or as directed by Geotechnical Engineer.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify utility company to remove and relocate utilities.
- D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- E. Protect plants, lawns, rock outcroppings, and other features to remain.
- F. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

3.03 TEMPORARY EXCAVATION SUPPORT AND PROTECTION

- A. Excavation Safety: Comply with OSHA's Excavation Standard, 29 CFR 1926, Subpart P.
 - 1. Excavations in stable rock or in less than 5 feet in depth in ground judged as having no cave-in potential do not require excavation support and protection systems.
 - 2. Depending upon excavation depth, time that excavation is open, soil classification, configuration and slope of excavation sidewalls, design and provide an excavation support and protection system that meets the requirements of 29 CFR 1926, Subpart P:
 - a. Sloping and benching systems.
 - b. Support systems, shield systems, and other protective systems.
- B. Leave excavation support and protection systems, used as formwork or within 10 feet of existing foundations, permanently in place, unless otherwise noted.
 - 1. Cut off top 4 feet below grade, abandon remainder.

3.04 EXCAVATING

- A. Excavate to accommodate new structures and construction operations.

1. Excavate to the specified elevations.
 2. Excavate to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work.
 3. Cut utility trenches wide enough to allow inspection of installed utilities.
 4. See Section 312316.26 for required excavation clearances for pipes in utility trenches.
 5. Hand trim excavations. Remove loose matter.
- B. Notify Architect of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Provide temporary means and methods, as required, to remove all water from excavations until directed by Architect. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.05 SUBGRADE PREPARATION

- A. See Section 312323 for subgrade preparation at general excavations.

3.06 FILLING AND BACKFILLING

- A. Do not fill or backfill until all debris, water, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation.

3.07 REPAIR

- A. Correct areas that are over-excavated and load-bearing surfaces that are disturbed; see Section 312323.

3.08 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Provide for visual inspection of load-bearing excavated surfaces by Architect before placement of foundations.

3.09 CLEANING

- A. Stockpile excavated material to be re-used in area designated on site in accordance with Section 312200.
- B. Remove excavated material that is unsuitable for re-use from site.
- C. Remove excess excavated material from site.

3.10 PROTECTION

- A. Divert surface flow from rains or water discharges from the excavation.
- B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.
- C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.
- D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION

**SECTION 31 23 16.13
TRENCHING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Excavation of trenches, pipe bedding, backfilling, and compaction for storm sewer, culverts, and water service.

1.02 RELATED SECTIONS

- A. The following sections contain requirements that relate to this section:
 - 1. Section 02 32 00 – Geotechnical Investigation
 - 2. Section 31 20 00 – Earthmoving
 - 3. Section 33 10 00 – Water System Construction
 - 4. Section 33 40 00 – Storm Sewer Construction

1.03 REFERENCES

- A. ASTM C33-586 Specification for Concrete Aggregate
- B. ASTM C136-84a Method for Sieve Analysis of Fine and Coarse Aggregate
- C. ASTM D698-78 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-lb (2.49-kg) Rammer and 12-in. (304.8 mm) Drop
- D. ASTM D1557-78 Test Methods for Moisture-Density Relations of Soil-Aggregate Mixtures Using 10-lb. (4.54- kg) Rammer and 18-in. (457-mm) Drop
- E. ASTM D2487-85 Classification of Soils for Engineering Purposes
- F. ASTM D2922-81 Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- G. ASTM D3017-78 Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- H. Where reference is made to the “Construction Standards”, it shall be construed to mean the City of Madison’s Construction Standards, except the method of measurement and basis of payment shall not apply.
- I. Where reference is made to the “Standard Specifications”, it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- J. Where reference is made to the “State Specifications”, it shall be construed to mean the pertinent section of the Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- K. Where reference is made to the “Geotechnical Report”, it shall be construed to mean the geotechnical report in Section 02 32 00.

1.04 SUBMITTALS

- A. Field Testing Reports:
 - 1. Density and Moisture Tests: Submit within 14 days of test date.

PART 2 PRODUCTS

2.01 GENERAL

- A. Conform to requirements of Standard Specifications:
 - 1. Where conflicts between this specification, the Standard Specifications, and the Construction Standards exist, the most stringent requirements shall apply.

2.02 BEDDING AND COVER MATERIALS

A. Water Mains:

1. Bedding and cover material shall conform to the Construction Standards and Standard Specifications.

2.03 BASE MATERIAL

- A. Crushed Stone: Hard, durable particles of crushed stone or gravel substantially free from shale or lumps of clay or loam. When crushed stone base is required under sewer, water main, or structures, gradation shall meet the requirements of Type 1. When crushed stone for trench bottom stabilization is required to affect soil stability or drainage, it shall meet the gradation requirements of Type 2.

Type 1: 1½-Inch Crushed Stone

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
2 Inch	100
1½ Inch	90-100
1 Inch	20-55
¾ Inch	0-15
½ Inch	0-5

Type 2: 2-Inch Crushed Stone

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
2½ Inch	100
2 Inch	90-100
1½ Inch	35-70
1 Inch	0-15
½ Inch	0-5

2.04 BACKFILL

- A. Granular Backfill: Durable particles ranging from fine to coarse in a substantially uniform combination. Sufficient fine material shall be present to fill all the voids of the coarse material. Some fine clay or loam particles are desirable, but clay or loam lumps shall not be present. Conform to the following gradation:

Granular Backfill

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
3 Inch	100
2 Inch	95-100
No. 4	35-60
Finer than No. 200	5-15

- B. Excavated Material: Natural soils classified in ASTM D2487 as Gravels (GW, GP GM and GC), Sands (SW, SP, SM and SC), and Silts and Clays (ML and CL). Silts and Clays classified as OL, MH, CH, OH, and PT are not acceptable unless specifically allowed by Engineer. Soil material shall be free from vegetable or other organic matter, trash, debris, stones larger than three inches and frozen material.
- C. Use of excavated material for backfill of public utilities shall be subject to approval of the Owner's Construction Representative and Owner's Geotechnical Consultant prior to its use.

PART 3 EXECUTION

3.01 GENERAL

- A. Conform to requirements of Standard Specifications.
 - 1. Where conflicts between this specification, the Standard Specifications, and the Construction Standards exist, the most stringent requirements shall apply.

3.02 EXAMINATION

- A. Verify fill materials to be used are acceptable.

3.03 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Maintain and protect existing utilities remaining, which pass through work area.
- C. Protect plant life, lawns, and other features remaining as a portion of the final landscaping.
- D. Protect bench marks, existing structures, shore protection structures and base materials, sidewalks, paving and curbs from excavation equipment and vehicular traffic.
- E. Protect above and below grade utilities which are to remain.
- F. Strip topsoil and stockpile on-site for re-use.
- G. When excavating across or within existing pavement, saw cut in neat straight lines.

3.04 DEWATERING

- A. Do not allow water to accumulate in the trench.
- B. Provide all dewatering equipment needed to accomplish the Work. Unless indicated otherwise, no additional compensation will be made for dewatering.
- C. No additional compensation will be made for crushed stone used for trench drainage.
- D. Dispose of water in a suitable manner without damage to property.
- E. Install, operate and abandon dewatering equipment in accordance with applicable state and local codes.
- F. Contact the WDNR for a permit if the quantity of water to be pumped from dewatering equipment is in excess of 70 GPM.

Wisconsin Department of Natural Resources
Private Water Supply Section
P.O. Box 7921
Madison, WI 53707-7921

3.05 EXCAVATION

- A. Excavate subsoil to required depth and grade.
- B. Cut trenches sufficiently wide to enable installation of the utilities and allow inspection. Normal trench width below the top of the pipe shall be the nominal pipe diameter plus 24 inches. Do not undercut trench walls.
- C. Trench walls above the top of the pipe shall be as dictated by soil type and safety requirements. Provide shoring and bracing as required to maintain safe working conditions.
- D. Stockpile excavated material in area designated on-site.

3.06 BEDDING

- A. Place bedding in trench before installing pipe.
- B. Support pipe during placement and compaction of bedding.
- C. Provide a minimum of 4 inches of bedding material under the pipe barrel and under the bell.
- D. Lightly consolidate the material so that it fills and supports the haunch area and encases the pipe to the limits shown on the Drawings.

- E. If excavation is carried deeper than 6 inches below the pipe barrel, backfill the excess depth with 1½-inch crushed stone meeting the requirements of paragraph 2.03 A of this section.
- F. After the pipe has been laid and jointed, place bedding materials by hand or equally careful means around the sides of the pipe and up to a level 12 inches above the pipe. Lightly consolidate the material.

3.07 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen materials.
- B. Do not backfill over wet, frozen, or spongy subgrade surfaces.
- C. Granular Backfill: Place and compact materials in continuous layers not exceeding 12 inches compacted depth.
- D. Natural Soil Backfill: Place and compact material in continuous layers not exceeding 8 inches compacted depth.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Utilize surplus backfill materials on project or remove surplus backfill material from site.
- G. Leave fill material stockpile areas completely free of excess fill materials.
- H. At all manholes, 3/4-inch crusher run stone shall be installed from the top of the cone to the top of the casting.

3.08 TOLERANCES

- A. Top Surface of Backfilling Under Paved Areas: ±.05 feet from required elevations
- B. Top Surface of General Backfilling: ±0.2 feet from required elevations

3.09 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under the provisions of Section 01 00 00 by the Owner's testing agency.
- B. Density/moisture relationship will be determined in accordance with ASTM D1557 (Modified Proctor).
- C. Compaction testing will be performed by Owner's testing agency and will be in accordance with ASTM D2922 and ASTM D3017.
- D. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest at no cost to the Owner. Additional testing of the removed and replaced work will be at the expense of the Contractor.
- E. Frequency of Tests:
 - 1. For trenches under paved areas - one test per 100 linear feet of trench.
 - 2. For trenches under unpaved areas - one test per 250 linear feet of trench.

3.10 COMPACTION SCHEDULE

- A. For paved areas compact to at least 95% of optimum density in accordance with ASTM D1557.
- B. For unpaved areas compact to at least 92% of optimum density in accordance with ASTM D1557.

END OF SECTION

SECTION 312323
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Filling, backfilling, and compacting for building volume below grade, footings, slabs-on-grade, paving, and utilities within the building.
- B. Backfilling and compacting for utilities outside the building to utility main connections.
- C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete.
- B. Section 312316 - Excavation: Removal and handling of soil to be re-used.

1.03 REFERENCE STANDARDS

- A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base, and Surface Courses 2017 (Reapproved 2021).
- B. AASHTO T 180 - Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18 in.) Drop 2021, with Errata (2022).
- C. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2019.
- D. ASTM C150/C150M - Standard Specification for Portland Cement 2022.
- E. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- F. ASTM C796/C796M - Standard Test Method for Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam 2019.
- G. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)) 2012 (Reapproved 2021).
- H. ASTM D1556/D1556M - Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method 2015, with Editorial Revision (2016).
- I. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)) 2012 (Reapproved 2021).
- J. ASTM D1603 - Standard Test Method for Carbon Black Content in Olefin Plastics 2020.
- K. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.
- L. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2017, with Editorial Revision (2020).
- M. ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils 2017, with Editorial Revision (2018).
- N. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon Arc-Type Apparatus 2021.
- O. ASTM D6637/D6637M - Standard Test Method for Determining Tensile Properties of Geogrids by the Single or Multi-Rib Tensile Method 2015.
- P. ASTM D6817/D6817M - Standard Specification for Rigid Cellular Polystyrene Geofoam 2017 (Reapproved 2021).
- Q. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017a, with Editorial Revision (2021).

1.04 QUALITY ASSURANCE

- A. Designer Qualifications: Perform design of structural fill under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.
- B. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
 - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
 - 2. Prevent contamination.
 - 3. Protect stockpiles from erosion and deterioration of materials.

PART 2 PRODUCTS

2.01 FILL MATERIALS

- A. Concrete for Fill: Lean concrete.
- B. Concrete for Fill: See Section 033000; compressive strength of 2,500 psi.
- C. Granular Fill - Gravel - Fill Type ____: Pit run washed stone; free of shale, clay, friable material and debris.
 - 1. Graded in accordance with ASTM D2487 Group Symbol GW.
 - 2. Graded in accordance with ASTM C136/C136M, within the following limits:
 - a. 2 inch sieve: 100 percent passing.
 - b. 1 inch sieve: 95 percent passing.
 - c. 3/4 inch sieve: 95 to 100 percent passing.
 - d. 5/8 inch sieve: 75 to 100 percent passing.
 - e. 3/8 inch sieve: 55 to 85 percent passing.
 - f. No. 4 sieve: 35 to 60 percent passing.
 - g. No. 16 sieve: 15 to 35 percent passing.
 - h. No. 40: 10 to 25 percent passing.
 - i. No. 200: 5 to 10 percent passing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

- A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

3.03 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.

- F. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- G. Correct areas that are over-excavated.
 - 1. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.
- H. Compaction Density Unless Otherwise Specified or Indicated:
 - 1. Under paving, slabs-on-grade, and similar construction: 97 percent of maximum dry density.
- I. Reshape and re-compact fills subjected to vehicular traffic.
- J. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FILL AT SPECIFIC LOCATIONS

3.05 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

3.06 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Soil Fill Materials:
 - 1. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.
 - 2. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.
 - 3. If tests indicate work does not meet specified requirements, remove work, replace and retest.
 - 4. Frequency of Tests: _____.
 - 5. Proof roll compacted fill at surfaces that will be under slabs-on-grade.

3.07 CLEANING

- A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.
- B. Leave unused materials in a neat, compact stockpile.
- C. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.
- D. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

**SECTION 31 25 00
EROSION CONTROL**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes
 - 1. Section 31 20 00 – Earthmoving
 - 2. Section 31 32 00 – Soil Stabilization
 - 3. Section 32 92 19 – Seeding and Sodding

1.02 REFERENCE STANDARDS

- A. Where reference is made to the “Construction Standards”, it shall be construed to mean the City of Madison’s Construction Standards, except the method of measurement and basis of payment shall not apply.
- B. Where reference is made to the “Standard Specifications”, it shall be construed to mean the pertinent section of the Standard Specification for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the “State Specifications”, it shall be construed to mean the pertinent section of the Standard Specification for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the “Geotechnical Report”, it shall be construed to mean the geotechnical report in Section 02 32 00.

1.03 SUBMITTALS

- A. Provide a detailed Erosion Control and Sequencing Plan for approval by the Owner’s Construction Representative, if differing from the approved sequencing and erosion control plans issued as part of the Contract Documents.
- B. Provide manufacturer’s data and WisDOT Product Acceptability List verification for silt fence, temporary ditch checks and erosion mat for review and approval by Owner’s Construction Representative prior to procurement.
- C. Identify seed supplier and provide seed source, purity and germination specifications, for all seed mixes specified for installation in this section, to Owner’s Construction Representative for approval prior to procurement.
- D. Provide manufacturer’s data for fertilizer for review and approval by Owner’s Construction Representative prior to procurement.

1.04 QUALITY ASSURANCE

- A. Contractor shall ensure that the General Provisions and Special Conditions of the following permits issued for the project shall be complied with at all times.
 - 1. City of Madison Stormwater Management and Erosion Control Permit.
 - 2. WDNR General Permit to discharge under the Wisconsin Pollutant Discharge Elimination System for land disturbing construction activities.
- B. Inspect erosion control materials and supplies after delivery to verify that no damage has occurred.
- C. The status of erosion control measures will be an item of discussion in every weekly construction meeting. All corrective actions required during construction meetings shall be accomplished within three working days of the meeting date.
- D. Contractor shall provide weekly written reports on the erosion control system for the previous week to the Owner’s Construction Representative for the duration of construction in a format approved by the Engineer. These reports shall be provided at each weekly construction

meeting and shall be reported to the City's erosion control reporting representative (electronic PDF preferred). The weekly erosion control report shall describe:

1. The extent of erosion control system installed.
2. The condition of erosion control measures for that week, based on field observations.
3. Any accidental release of sediment.
4. A summary of daily rainfall/snowmelt data for the week.
5. Any specific corrective action taken.
6. Corrective action that needs to be taken.
7. The person that conducted the observations shall sign the report.

1.05 WARRANTY

- A. Work conducted under this section shall be subject to the one-year warranty provisions described in the General Conditions of the Contract.

1.06 SEQUENCING AND SCHEDULING

- A. The sequencing of project construction activities will be generally as described in the plans and Contract Documents. The specific sequence for construction within a particular area shall be agreed upon with Owner's Construction Representative prior to construction within that area.
- B. All erosion control measures shall be completely installed for each construction area and approved by Owner's Construction Representative before any other construction activity takes place.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Silt Fence:
 1. Silt fence shall be as specified in the WDNR Construction Site Erosion & Sediment Control Technical Standard 1056.
- B. Erosion Mat - Class I Type B and Class II Type B:
 1. Erosion control mat shall be to the requirements of WDNR Construction Site Erosion & Sediment Control Technical Standard 1052.
 2. WisDOT Erosion Mat Class I Type B erosion mat meeting the requirements of Section 628.2.2 of the State Specifications shall be used for all seeded areas within the public right-of-way unless noted otherwise on the plans.
- C. Seeding Temporary:
 1. Temporary seed shall be 100% Annual Ryegrass, with purity and germination requirements as specified in Section 630.2.1.5.1.2 of the State Specifications or as indicated in the WDNR Construction Site Erosion & Sediment Control Technical Standard 1059. Temporary seeding will be incidental to the grading items in the contract.
- D. Mulch:
 1. Mulch proposed for use shall be clean straw, with no weed material or seeds, and shall be approved Engineer before use.
 2. Mulch shall meet the standards set forth within the WDNR Construction Site Erosion & Sediment Control Technical Standard 1058.
- E. Tracking Pads:
 1. Stone for use in temporary access pads shall range in size from 3 inches to 6 inches in diameter.
 2. Pad shall be a minimum of 50 feet long.
 3. Pad shall meet the requirements of WDNR Construction Site Erosion & Sediment Control Technical Standard 1057.

F. Fertilizer – Type A:

1. Fertilizer shall be as specified in Section 629.2.1.2 of the State Specifications for Fertilizer, Type A.

G. Riprap:

1. Provide riprap as specified in Section 606.2.1 of the State Specifications for the size and type indicated on the Construction Drawings or bid form. If the size is not specified, medium riprap shall be used.

H. Temporary Ditch Checks:

1. Provide temporary ditch checks of material found on WisDOT's PAL list.
2. Submit a written copy of the proposed material and manufacturer's specification for installing the product on slopes channels, and next to live traffic lanes as applicable to the project to the Owner's Construction Representative for approval prior to installation.
3. Erosion Bales shall not be used on this project as a sole means of perimeter erosion control. Erosion bales may be used to reinforce or support other primary means of perimeter erosion control, like silt fence.

I. Inlet Protection – Type D:

1. Use a Type FF geotextile fabric conforming to Section 645.2.2.1 of the State Specifications, except use a woven polypropylene fabric. Furnish Type FF geotextiles, or bags manufactured from Type FF geotextiles, from the WisDOT's PAL list.
2. Use FlexStorm Inlet Filters as indicated in plans as approved by Dane County and Municipality.

J. Rock Check Dams:

1. Provide rock check dams in accordance with the standard detail Drawings at locations identified in the plans and as directed by the Owner's Construction Representative.

PART 3 EXECUTION

3.01 GENERAL

- A. Establish all heights and grades to properly execute work from benchmark established by others.
- B. Contractor shall provide all surveys to accurately locate the construction on the site.
- C. Provide temporary erosion control measures in accordance with the Contractor's approved erosion control and sequencing plan. These measures may include temporary sedimentation basins, diversion berms and swales and other measures constructed in accordance with the WDNR Technical Standards.

3.02 EROSION CONTROL STRUCTURES

- A. Runoff diversion berms shall be constructed of clean topsoil, 2 feet high, with 3H:1V side slopes, and seeded and mulched immediately after installation.
- B. Silt fence shall be placed according to the WDNR Construction Site Erosion & Sediment Control Technical Standard 1056.

3.03 TEMPORARY SEEDING AND MULCHING

- A. Temporary seeding shall be conducted as described in Section 630.3.3 of the State Specification, with sowing using either Method A or Method B. Temporary seeding areas shall receive fertilizer at the rate of 10 lbs./1,000 sq. ft.
- B. Temporary seed shall receive mulch at the rate of 2,500 lbs./acre, and shall be crimped into the soil using WisDOT Procedure specified in Section 627.3.2.3 of the State Specifications.
- C. Disturbed areas within the construction site shall be graded, prepared for seeding, and seeded to conform to the following requirement for the maximum duration of bare-ground conditions:

1. Areas within 100 feet of and draining directly to wetlands or watercourses, with slopes less than 5%: seven days.
2. Areas within 100 feet of and draining directly to wetlands or water courses, with slopes between 5% and 25%: three days.
3. Areas in the interior of the site that do not drain directly to wetlands and water courses: 30 days.

3.04 EROSION MAT - CLASS I TYPE B AND CLASS II TYPE B

- A. Erosion control mat shall be applied according to WDNR Technical Standards 1052 or 1053 as applicable and manufacturer's requirements.

3.05 TRACKING PADS

- A. Erosion control mat shall be applied according to WDNR Technical Standards 1052 or 1053 as applicable and manufacturer's requirements.
- B. Tracking Pads shall be installed and maintained in accordance with Section 628.3.16 of the State Specification.
- C. Tracking Pads shall be maintained throughout construction and removed once construction is completed or the adjacent work area is stabilized.

3.06 FERTILIZER - TYPE A

- A. Fertilizer applied to temporary seeding areas shall be applied as specified in Section 629.2.1.2 of the State Specification at locations where temporary seeding is required.

3.07 RIPRAP

- A. Place riprap of the specified size at locations as shown in the Construction Drawings.
- B. Place riprap in accordance with Section 606.3 of the State Specifications.
- C. Riprap at outfall locations shall be placed immediately after or concurrent with the placement of the apron endwall. Riprap at the outfalls is intended to be left in place as a permanent erosion control measure.

3.08 TEMPORARY DITCH CHECKS

- A. Place and maintain temporary ditch checks at the locations shown on the Construction Drawing and as directed by the Owner's Construction Representative.
- B. Place and maintain temporary ditch checks in accordance the manufacturer's instructions and Section 628.3.14 of the State Specifications, except erosion bales are not to be used as temporary ditch checks on this project.
- C. Remove ditch checks after the slope ditches are stabilized in accordance with Section 628.3.14 of the State Specifications.

3.09 INLET PROTECTION - TYPE D

- A. Furnish install and maintain inlet protection in accordance with Section 628.3.13 of the State Specifications.
- B. Inlet protection shall be maintained throughout construction, and removed once the area adjacent to the inlet has been stabilized and as directed by the Owner's Construction Representative.

3.10 MAINTENANCE AND CLEANUP

- A. The erosion control system shall be maintained throughout the duration of the construction project, in accordance with the procedures identified in Section 628.3.4.2 of the State Specifications.
- B. The erosion control system shall be inspected immediately after each rainfall of more than 0.5 inch, and daily during prolonged rainfall. All inspections shall be reported to the Owner's Construction Representative in the weekly erosion control system report.

- C. Accumulated sediment within the erosion control system shall be removed before one-half of the storage capacity of the erosion control measure is used, or as specified by the Owner's Construction Representative.
- D. Accumulated sediment in riprap shall be removed as directed by the Owner's Construction Representative during the project, and as a final condition of acceptance if deficiencies are noted at final walk through.

3.11 ROCK CHECK DAMS

- A. Place and maintain rock check dams at the locations shown on the Construction Drawings and as directed by the Owner's Construction Representative.
- B. Remove sediment deposits when the build-up reaches approximately one-third of the height of the rock check dam, and as directed by the Owner's Construction Representative. Contractor may also remove and replace the stone check with sediment and replace with new stone at their discretion. Each location will be paid for initial placement only maintenance is incidental to this item.
- C. Remove rock check dams after the slopes and ditches are stable and turf develops enough to make future erosion unlikely. The Owner's Construction Representative will determine when the contractor meets this criteria.

END OF SECTION

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**SECTION 31 32 00
SOIL STABILIZATION**

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Geotextile fabric and geogrid for stabilization of subgrade.
- B. Related requirements:
 - 1. Section 31 20 00 - Earthmoving

1.02 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.

1.03 SUBMITTALS

- A. Submit manufacturer's specifications for geotextile fabric and geotextile grid.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide products from one of the following manufacturers as specified in the Materials paragraph below:
 - 1. TenCate Geosynthetics North America (Mirafi), Pendergrass, GA - (706) 693-2226, www.tencate.com
 - 2. Hanes Geo Components (WEBTEC), Winston Salem, NC - (336) 747-1600, www.hanesgeo.com
 - 3. Tensar International Corp., Atlanta, GA - (888) 828-5126, www.tensarcorp.com
 - 4. Thrace-LINQ Inc., Summerville, SC - (843) 873-5800, www.thracelinq.com
 - 5. DuPont (Tytar), Summerville, SC - (843) 832-6860, www.typargeo.com
 - 6. Synteen Technical Fabrics, Lancaster, SC - (800) 796-8336, www.synteen.com

2.02 MATERIALS

- A. Aggregate:
 - 1. Coarse Aggregate: Crushed carbonate, crushed gravel, crushed air-cooled slag, granulated slag, a mixture of crushed and granulated slag, or other types of suitable material meeting the gradation requirements of Section 305 of "State of Wisconsin Standard Specifications for Highway and Structure Construction", latest edition.
 - 2. Fine Aggregate: Sand - Natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter meeting the gradation requirements of Section 305 of "State of Wisconsin Standard Specifications for Highway and Structure Construction", latest edition.
 - 3. Subsoil: Existing to be re-used.

2.03 ACCESSORIES

- A. Geotextile Fabric for Stabilization - provide one of the following:
 - 1. Mirafi HP 370 or HP 570, by TenCate
 - 2. SF40 or SF65, by DuPont
 - 3. GTF-200 or 300, by Thrace-LINQ
 - 4. TerraTex HD, by Hanes
- B. Geogrid for Stabilization - provide one of the following:
 - 1. Biaxial Geogrid Type 1 (formerly BX 1100), by Tensar

2. Biaxial Geogrid Type 2 (formerly BX 1200), by Tensar
3. Mirafi BXG 11, by TenCate
4. Mirafi BXG 12, by TenCate
5. SF 11, by Synteen
6. SF 12, by Synteen

PART 3 EXECUTION

3.01 PREPARATION

- A. Start stabilization only when weather and soil conditions are favorable for successful application of proposed material.
- B. Proof-roll subgrade to identify areas in need of stabilization.

3.02 EQUIPMENT

- A. Perform operations using suitable, well maintained equipment capable of excavating subsoil, mixing and placing materials, wetting, consolidating, and compacting of material.

3.03 EXCAVATION

- A. Excavate subsoil to depth sufficient to accommodate soil stabilization.
- B. Remove lumped subsoil, boulders, and rock that interfere with achieving uniform subsoil conditions.
- C. Notify Owner's Construction Representative in writing of unexpected subsurface conditions. Discontinue affected work in area until notified to resume work.
- D. Remove excess excavated material from site.

3.04 GEOTEXTILE FABRIC AND/OR GEOGRID

- A. Place geotextile fabric and/or geogrid over subsoil surface, lap edges and ends in accordance with manufacturer's recommendations in those areas that are shown on Construction Drawings or in those areas that need additional stabilization prior to placement of base course. Place geotextile fabric and/or geogrid in accordance with manufacturer's recommendations.

3.05 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor in accordance. Except for specified mandatory testing, field quality control testing and inspection shall be at the discretion of the Contractor as necessary to assure compliance with Contract requirements. The Owner's Construction Representative specified below shall not be considered a substitute for the Contractor's responsibility to perform similar routine, necessary, and customary testing and inspection of the methods and frequency suitable for the type of work involved.

3.06 TESTING

- A. Field Density: Field in-place density shall be determined as specified in Section 31 20 00 - Earthmoving.

END OF SECTION

**SECTION 316613.13
RAMMED AGGREGATE PIERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Shaft excavation; placement and compaction of aggregate.

1.02 RELATED REQUIREMENTS

- A. Section 310916.21 - Pile Load Tests: Requirements for pier load tests.

1.03 REFERENCE STANDARDS

- A. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate number, depth, and location of piers.
- C. Design Data: Submit the following:
 - 1. Detailed design calculations.
 - 2. Description of quality control and field testing program.
 - 3. Documentation of design data sealed by a Professional Structural Engineer licensed in the State in which the Project is located.
- D. Test Reports: Document test results, and compliance or non-compliance with approved design, for:
 - 1. Modulus test.
 - 2. Bottom stabilization test.
 - 3. Cap stabilization test.
 - 4. Uplift load test.
- E. Field Quality Control Submittals: Submit daily.
 - 1. Pier location.
 - 2. Volume of aggregate.
 - 3. Installed pier depth.
 - 4. Number of lifts.
 - 5. Description of placement method and forces applied.
 - 6. Design elevation at top and bottom of pier.
 - 7. Actual, installed elevation at top and bottom of pier.
 - 8. Documentation of unusual or unexpected conditions encountered.
 - 9. Description of aggregate used.
- F. Designer's Qualification Statement.
- G. Project Record Documents: Record actual locations of piers, pier diameter, and pier length. Accurately record the following on project record documents:
 - 1. Sizes, lengths, and locations of piers and footing groups.
 - 2. Sequence of placement.
 - 3. Final base and top elevations.
 - 4. Deviation from indicated locations.

1.06 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements.

Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.

1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify recycled material content for recycled content products.
 - b. Certify source for regional materials and distance from Project site.

1.07 QUALITY ASSURANCE

- A. Design piers under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State in which the Project is located.
- B. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of documented experience.
- C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aggregate: Open graded, aggregate material with the following characteristics:
 1. Maximum Particle Size: 1-1/2 inches.
 2. Minimum Particle Size: 1/2 inch.

PART 3 EXECUTION

3.01 PREPARATION

- A. Use placement method that will not cause damage to nearby structures.
- B. Protect structures near the Work from damage.
- C. Prepare to place piers from excavated working elevation. Do not begin installation until ground elevation at each pier location is at least 12 inches higher than indicated top bearing level of pier.

3.02 INSTALLATION

- A. Drill concentric and vertical pier shafts to diameters and depths indicated.
- B. Remove loose material from shaft sides and bottom. Maintain shafts free of water.
- C. Set top bearing levels of piers to elevations indicated.
- D. Prepare pier top to receive spread footing.

3.03 TOLERANCES

- A. Maximum Variation From Vertical: 1 in 48.
- B. Maximum Variation From Design Top Elevation: 4 inches.
- C. Maximum Out-of-Position: 6 inches.

3.04 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 014000 - Quality Requirements.
- B. Perform load tests to requirements of Section 310916.21.
- C. Test piers:
 - 1. Type: Same diameter and type as specified for other pier, placed in same manner.
 - 2. Number: 3, minimum.

3.05 UNACCEPTABLE PIERS

- A. Unacceptable Piers: Piers that fail, are placed out of position, are below elevations, or are damaged.

END OF SECTION

SECTION 316615 HELICAL FOUNDATION PILES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Helical piles used to support compression loads.

1.02 DEFINITIONS

- A. Specific terms used in this section are defined below. Terms not defined below are defined in DFI TM-GLOS-1 first and then by common usage.
- B. Extension Section: Helical foundation component installed between lead section and load transfer device.
- C. Effective Torsional Resistance: Average installation torque typically taken over a distance equal to last three diameters of penetration of largest helix plate.
- D. Geotechnical Capacity (or, Ultimate Soil Capacity): Maximum load resisted.
- E. Lead Section: First helical foundation component installed in soil.
- F. Loads: Forces or other actions that result from weight of all building materials, occupants and their possessions, environmental effects, differential movement, and restrained dimensional changes. Permanent loads are those loads in which variations over time are rare or of small magnitude. All other loads are variable loads (see also Nominal Load below).
- G. Nominal Load: Magnitude of loads determined by engineer, including dead load, live load and other imposed by building code requirements
- H. Reveal: Distance along longitudinal axis from ground surface to end of last installed extension of a foundation.
- I. Safety Factor: Ratio of ultimate pullout resistance to nominal load.

1.03 REFERENCE STANDARDS

- A. AISC 360 - Specification for Structural Steel Buildings 2022.
- B. ASTM A29/A29M - Standard Specification for General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought 2020.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021a.
- F. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel 2021, with Editorial Revision.
- G. ASTM D1143/D1143M - Standard Test Methods for Deep Foundation Elements Under Static Axial Compressive Load 2020.
- H. DFI TM-GLOS-1 - Deep Foundation Institute Technical Manual; Glossary of Foundation Terms 1981.
- I. SAE J429 - Mechanical and Material Requirements for Externally Threaded Fasteners 2014.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Product list, with manufacturer's model designations; published capacities for installed assemblies, including load transfer devices.
- C. Design Data: Submit documentation of foundation design, signed and stamped by foundation professional engineer licenced in the State of Wisconsin; include:
 - 1. Statement that proposed foundations meet specified design criteria.
 - 2. Nominal load on each foundation element.

3. Maximum allowable installation torque of each selected product.
 4. Calculated theoretical geotechnical capacity.
 5. Minimum effective torsional resistance requirements.
 6. Minimum embedment lengths and such other site specific embedment depth requirements.
 7. Inclination angle and location tolerance requirements.
 8. Pre-tensioning requirements, if any.
- D. Designer's Qualification Statement.
- E. Installer's Qualification Statement.
- F. Surveyor's Qualification Statement.
- G. Installation Logs:
1. Submit final copy of all installation logs within two weeks after completing all helical foundation work.
- H. Project Record Documents: After work is complete, submit certification from surveyor that installed foundation locations are as shown on drawings.

1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Experienced in design of helical foundations of the type involved on this project, as evidenced by:
1. State registration/licensure as a professional engineer.
 2. Recognition by local authority having jurisdiction.
 3. List of three or more similar projects designed within the previous three years and names of project representatives who can verify such participation.
 4. Manufacturer's written recommendation.
- B. Installer Qualifications: Experienced in installation of helical foundations of the type involved on this project, as evidenced by:
1. Manufacturer's certificate of competency in installing helical piles.
 2. List of three or more similar projects completed within the previous three years and names of representatives who can verify such participation.
 3. Letter from manufacturer stating ability and intent to provide on-site supervision.
 4. List of all safety violations lodged against installer within previous three years and current status/final resolutions thereof.
- C. Surveyor Qualifications: Engineer or land surveyor licensed in the State in which the Project is located.

PART 2 PRODUCTS

2.01 HELICAL FOUNDATION DESIGN CRITERIA

- A. It is Contractor's responsibility to design, or obtain qualified design, of the helical foundations as indicated in Contract Documents.
1. Information necessary for design that is contained in Contract Documents includes:
 - a. Locations of foundation elements.
 - b. Nominal design load for each foundation element, including dead load, live load and other loads required by building codes.
 2. Subsurface geotechnical data may be obtained from Section 023200 - Geotechnical Investigation..
- B. Helical Foundation Elements: One or more helical deformed plates (helix plates) attached to a central shaft with a load transfer device for attachment to a structure; entire element resisting applied loads by soil pressure.
1. Design foundations to support/resist the nominal design loads shown on drawings in accordance with AISC 360 Allowable Stress Design method.
 2. Select foundation elements based on allowable installation torque and calculated minimum embedment length; maximum embedment length, if any; and minimum effective torsional resistance.

3. Corrosion Service Life: 50 years, minimum.
 4. Use hollow, round shaft helical foundations where subject to compression only or to alternating tension and compression.
- C. Helical Piles:
1. Design with pile shaft sections in direct contact with couplings and no coupling bolts or welds in load path.
 2. Safety Factor: 2 times ultimate bearing resistance, minimum.
 3. Deflection: As indicated on drawings.
 4. Fit Up Tolerance: 1/16 inch, maximum.

2.02 MATERIALS

- A. All Components: Hot-dipped galvanized in accordance with ASTM A123/A123M.
- B. Helical Anchors and Piles: Hollow, round shaft of structural steel tube or pipe (rolled) complying with ASTM A572/A572M.
1. Size: 2-7/8 inches O.D. by 0.203 inch wall thickness.
 2. Torque Strength: 6,000 foot-pounds.
 3. Minimum Yield Strength: 60 kips per square inch.
- C. Helical Anchors and Piles: Hollow, round shaft of structural steel tube or pipe (welded or seamless) complying with ASTM A500/A500M.
1. Size: 2-7/8 inches O.D. by 0.276 inch wall thickness.
 2. Torque Strength: 8,000 foot-pounds.
 3. Minimum Yield Strength: 60 kips per square inch.
- D. Helical Anchors and Piles: Hollow, round shaft of structural steel tube or pipe (rolled) complying with ASTM A572/A572M.
1. Size: 3-1/2 inches O.D. by 0.313 inch wall thickness.
 2. Torque Strength: 16,000 foot-pounds.
 3. Minimum Yield Strength: 65 kips per square inch.
- E. Helix Plates: Round steel plates formed into helical spiral on matching metal dies to true helical shape and uniform pitch; welded to central shaft with all plates tracking the same path as leading helix.
1. Material: Hot rolled carbon steel sheet, strip, or plate complying with ASTM A36/A36M or ASTM A572/A572M, Grade 50.
 2. Thickness: 3/8 inch
 3. Profile: True helix-shaped plates, normal to shaft, leading and trailing edges within 1/4 inch of parallel.
 4. Pitch: 3 inches plus or minus 1/4 inch. All helix plates shall have uniform pitch.
 5. Edge Profile: Circular edge.
 6. Spacing: Between 2.4 and 3.6 times helix diameter.
- F. Bolts: SAE J429, Grade 8, bolts with nut.
- G. Couplings: Integral to shaft.
- H. Anchor Plates or Pile Caps: Load-transfer assembly welded from structural steel complying with ASTM A36/A36M.

PART 3 EXECUTION

3.01 PREPARATION

- A. Protect structures near the work and underground utilities from damage.
- B. Mark underground utilities as required by authority having jurisdiction. Avoid contact with all marked underground facilities.
- C. Locate the starting point of installation in relation to existing site elevation.

3.02 INSTALLATION

- A. Install helical foundations as shown on drawings and approved design documentation. In event of conflict between drawings and approved anchorage design documentation, do not begin

construction on any affected items until such conflict has been resolved.

- B. Comply with manufacturer's written installation requirements and recommendations for specific project site and conditions.
- C. Use installation methods that will not cause damage to existing adjacent or nearby structures.
- D. Keep and submit a log of helical foundation installations, including the following data:
 - 1. Date and time of installation.
 - 2. Location of foundation element.
 - 3. Installed foundation type and configuration.
 - 4. Foundation reveal.
 - 5. Total length of installed foundation element.
 - 6. Installed inclination of foundation element.
 - 7. For compression piles, installation torque measurements taken in one to three foot increments of total length.
 - 8. Actual effective torsional resistance.
 - 9. Calculated geotechnical capacity based on actual torsional resistance and soil parameters appropriate for subsurface conditions within three helix diameters above helix depth.
 - 10. Comments pertaining to interruptions, obstructions, or other relevant information.
- E. If required, position inclined helical anchors perpendicular in order to assist in advancement into soil before establishing required batter angle; after initial penetration, establish required angle of inclination
- F. Engage helical sections into soil and advance in a smooth, continuous manner at a rate of rotation of 5 to 25 RPM.
- G. Apply sufficient down pressure to uniformly advance helical sections a distance per revolution approximately equal to pitch of helix plates.
- H. Adjust rate of rotation and magnitude of down pressure for specific soil conditions and depths.
- I. Provide extension sections as required to achieve required results.
- J. Achieve both minimum embedment length and minimum effective torsional resistance prior to terminating foundation installation.
- K. Location Tolerances:
 - 1. Pile Head Horizontal Tolerance: Within 3 inches of location shown on drawings.
 - 2. Pile Shaft Angular Tolerance: Within 2 degrees of inclination angle shown on drawings.

3.03 ACHIEVEMENT OF EFFECTIVE INSTALLATIONS

- A. In the event that the initial installation of a foundation element does not achieve both minimum embedment length and minimum effective torsional resistance, adjust, repair, or replace that foundation element so that it does achieve both requirements.
 - 1. The following procedures are considered acceptable and do not require prior approval unless otherwise indicated.
 - 2. All other proposed remedies must be approved by Owner prior to implementation.
- B. Minimum Embedment Length Achieved Before Achieving Minimum Effective Torsional Resistance: Use one of the following procedures:
 - 1. Continue installation to greater depths until minimum effective torsional resistance is achieved, provided that, if maximum length constraint is applicable, continued installation does not exceed said maximum length.
 - 2. Demonstrate acceptable foundation performance through testing.
 - 3. Replace foundation with one having a different helix configuration, as follows:
 - a. Embed replacement to a length placing last helix at least three times its own diameter beyond position of first helix of replaced foundation.
 - b. Achieve minimum effective torsional resistance.
 - c. Do not exceed any applicable maximum embedment length.
 - d. Test replacement.

- C. Allowable Torque Rating Reached Before Achieving Minimum Embedment Length: Use one of the following procedures:
 - 1. If permitted by Owner, terminate installation at length achieved.
 - 2. Replace foundation with one having either a higher torsional strength rating or a different helix configuration, as follows:
 - a. Achieve minimum embedment length and minimum effective torsional resistance.
 - b. Embed replacement to length that places last helix at least three times helix diameter beyond position of first helix of replaced foundation.
 - c. Do not exceed any applicable maximum embedment length limit.
 - 3. If allowed by location tolerance or approved by Owner, remove foundation section and reinstall as follows:
 - a. Position reinstalled foundation at least three times diameter of largest helix away from initial location.
 - b. Achieve original embedment length and torsional resistance criteria.
 - c. If repositioning requires installation of additional helical foundations, adjust nominal loads for spacing changes.
- D. Maximum Embedment Length Reached Before Achieving Minimum Effective Torsional Resistance: Use one of the following procedures:
 - 1. If allowed by location tolerance or approved by Owner, remove and reinstall foundation as follows:
 - a. Position reinstalled foundation at least three times diameter of largest helix away from initial location.
 - b. Achieve original minimum embedment length and minimum effective torsional resistance.
 - c. If repositioning requires installation of additional helical foundations, adjust nominal loads for spacing changes.
 - 2. Demonstrate acceptable foundation performance through testing.
 - 3. De-rate load capacity of helical foundation and install additional foundations as necessary; de-rated capacity and additional foundation location shall be subject to approval of Owner.
 - 4. Replace foundation with one having a different helix configuration; achieve minimum embedment length and minimum effective torsional resistance.
- E. Failure of Field Quality Control Test: Use one of the following procedures:
 - 1. Install foundation to a greater depth and installation torque and re-test provided that, if a maximum embedment length constraint is applicable, continued installation will not exceed said maximum length constraint.
 - 2. Replace foundation with one having a different helix configuration. Embed last helix at least three times its own diameter beyond position of first helix of replaced foundation without exceeding any applicable maximum embedment length requirements. Re-test replacement.
 - 3. If approved by Owner, de-rate load capacity of helical foundation and install additional foundations at positions that are at least three times diameter of largest helix away from any other foundation locations; space anchors in cohesive soils not closer than four helix diameters.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Failure of Tests: Replace or re-drive, and re-test, helical foundations that any fail test and cannot be remedied using any of the procedures described above in "ACHIEVEMENT OF EFFECTIVE INSTALLATIONS" article.

END OF SECTION

**SECTION 32 05 00
COMMON WORK RESULTS FOR EXTERIOR IMPROVEMENTS**

PART 1 GENERAL

1.01 SCOPE

- A. This section provides information common to two or more technical sitework specification sections or items that are of a general nature, and not included in other sections.

1.02 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section:
1. Section 31 23 16 13 - Trenching
 2. Section 31 25 00 - Erosion Control
 3. Section 32 91 19 - Topsoil-Select Fill Materials and Application

1.03 REFERENCED ORGANIZATIONS

- A. Abbreviations of organizations referenced in these specifications are as follows:
- | | |
|--------|--|
| AASHTO | American Association of State Highway and Transportation Officials |
| ACPA | American Concrete Pipe Association |
| ANSI | American National Standards Institute |
| ASCE | American Society of Civil Engineers |
| ASME | American Society of Mechanical Engineers |
| ASTM | American Society for Testing and Materials |
| AWWA | American Water Works Association |
| AWS | American Welding Society |
| FHA | Federal Highway Administration |
| EPA | Environmental Protection Agency |
| NEC | National Electric Code |
| NEMA | National Electrical Manufacturers Association |
| NFPA | National Fire Protection Association |
| NSF | National Sanitation Foundation |
| OSHA | Occupational Safety and Health Administration |
| STI | Steel Tank Institute |
| UL | Underwriters Laboratories Inc. |
| WDNR | State of Wisconsin Department of Natural Resources |
| WISDOT | State of Wisconsin Department of Transportation |

1.04 REFERENCED DOCUMENTS

- A. Where reference is made to the "Construction Specifications", it shall be construed to mean the pertinent section of the City of Madison's Standard Construction Specifications, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- B. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the WISDOT Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the "Geotechnical Report", it shall be construed to mean the geotechnical report in Section 02 32 00.

1.05 QUALITY ASSURANCE

- A. Provide materials and products as required by individual specification sections. Refer to the General Conditions regarding substitutions.

- B. Provide quality assurance testing and reporting as required by individual specification sections.

1.06 SAFETY

- A. Contractor is solely responsible for worksite safety.
- B. Perform all work in accordance with applicable OSHA, state, and local safety standards.
- C. Contact Diggers Hotline at 1-800-242-8511 in accordance with statutory requirements. Request that non-member utilities and private utilities be located by the appropriate parties.

1.07 PERMITS

- A. Unless otherwise noted in the Contract Documents, Contractor shall be responsible for obtaining and paying for all permits necessary to complete the work.

1.08 CONSTRUCTION LIMITS

- A. Construction Limits are indicated on the Drawings. In the absence of such a designation on the Drawings, confine work to the minimum area reasonably necessary to undertake the work as determined by the Owner's Construction Representative. In no case shall construction activities extend beyond state property lines or construction easements.
- B. The Contractor shall restore all disturbed areas in accordance with the Drawings and Specifications. If plans and specifications do not address restoration of specific areas, these areas will be restored to pre-construction conditions as approved by the Owner's Construction Representative.

1.09 SUBMITTALS

- A. Refer also to the General Conditions and Division 1.
- B. Submit manufacturer's shop drawings, product data, samples, substitutions, and operation and maintenance (O&M) data for approval as required by individual specification sections.
- C. Submittals shall be provided to the Owner's Construction Representative for review and approval, unless otherwise directed. Submittals shall be submitted electronically by email in a PDF format unless otherwise directed.

1.10 OFF-SITE STORAGE

- A. Refer to Division 1.
- B. In general, the payments for materials stored off site will only be considered in instances where there is limited space available for storage on the site. Prior approval by the Owner's Construction Representative, together with the execution of a Storage Agreement, will be required.

1.11 CODES

- A. Comply with the requirements of all applicable, local, state, and federal codes.

1.12 CERTIFICATIONS AND INSPECTIONS

- A. Refer to the General Conditions.
- B. Obtain and pay for all required sampling, testing, inspections, and certifications except those expressly listed as provided by the Architect/Engineer (A/E) or other third-party in the Contract Documents. Deliver "originals" of certificates and documents to the Owner's Construction Representative within three days and provide "copies" to the City Engineer. Include copies of the certifications and documents in the O&M Manual.

PART 2 MATERIALS

2.01 BARRICADES, SIGNS, AND WARNING DEVICES

- A. Traffic barricades, traffic signs, and warning devices shall meet the requirements of applicable OSHA standards and the FHA Manual of Uniform Traffic Control Devices (MUTCD).

2.02 TEMPORARY PLASTIC BARRIER FENCING

- A. UV stabilized high-density polyethylene barrier fence free of holes tears and other defects. Provide 4-foot tall fence in diamond or rectangular pattern. Fencing shall be "safety orange" color, unless otherwise noted.
- B. Posts for temporary plastic barrier fencing shall be 5-foot tall, minimum 12-gauge, painted metal posts.

PART 3 EXECUTION

3.01 MAINTENANCE OF SITE AND BUILDING ACCESS/EGRESS

- A. Unless otherwise shown or directed, maintain existing access and egress to the facility throughout construction. Maintain ANSI A117 compliant access for disabled persons, delivery access, emergency vehicle access, and emergency egress. Do not interrupt access and egress without prior written approval from the Owner's Construction Representative.

3.02 CONTINUITY OF EXISTING TRAFFIC/PARKING AND TRAFFIC CONTROL

- A. Do not interrupt or change existing traffic, delivery, or parking outside the requirements of the staging plan without prior written approval from the Owner's Construction Representative. When interruption is required, coordinate schedule with the Owner agency to minimize disruptions. When working in public right-of-way, obtain all necessary approvals and permits from applicable municipalities and WisDOT.
- B. When Contractor's activities impede or obstruct traffic flow, Contractor shall provide traffic control devices, signs and flaggers in accordance with other Contract Documents and the current version of the MUTCD, or as shown on the Drawings.

3.03 PROTECTION AND CONTINUITY OF EXISTING UTILITIES

- A. Verify the locations of any water, drainage, gas, sewer, electric, drainage, gas, sewer, electric, telephone/communication, fuel, steam lines or other utilities and site features which may be encountered in any excavations or other sitework. All lines shall be properly underpinned and supported to avoid disruption of service.
- B. Do not interrupt or change existing utilities without prior written approval from the Owner's Construction Representative, affected utilities and users. Notify all users impacted by outages a minimum of 48 hours in advance of outage. Notification shall be provided in writing and describe the nature and duration of outages and provide the name and number of Contractor's foreman or other contact.
- C. Any service connections encountered which are to be removed shall be cut off at the limits of the excavation and capped in accordance with the requirements of applicable codes and any specifications governing such removals.

3.04 PROTECTION OF EXISTING WORK AND FACILITIES

- A. Verify the locations of, and protect, any signs, paved surfaces, buildings, structures, landscaping, streetlights, utilities, and all other such facilities that may be encountered or interfered with during the progress of the work. Take measures necessary to safeguard all existing work and facilities that are outside the limits of the work or items that are within the construction limits but are intended to remain. Report any damage to existing facilities to the Owner's Construction Representative immediately. Correct and pay for all damages.

3.05 STORMWATER/EXCAVATION WATER MANAGEMENT

- A. Control grading around structures, pitch ground to prevent water running into excavated areas.
- B. Pits and other excavations shall be maintained free of water.
- C. Provide trenching, pumping, other facilities required.
- D. Notify A/E if springs or running water are encountered in excavation; provide discharge by trenches, drains, pumping to point outside of excavation. Provide information to A/E of points and areas that water will be discharged. At the Engineer's option, the Contractor shall drain the spring to the storm sewer system by the use of field tile.

- E. Be responsible for control measures to prevent damage from flooding, erosion, and sedimentation to on-site and off-site areas.

END OF SECTION

**SECTION 32 11 23
AGGREGATE BASE COURSE**

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes provisions for providing aggregate base course as the foundation for hot-mixed asphalt paving, concrete curb and gutter, and concrete sidewalk.

1.02 RELATED SECTIONS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 - Specification Sections, apply to this Section.
- B. The following sections contain requirements that relate to this Section:
 - 1. Section 31 20 00 – Earthmoving
 - 2. Section 31 22 00 – Soil Stabilization
 - 3. Section 32 12 16.13 – Plant-Mix Asphalt

1.03 REFERENCES

- A. Where reference is made to the “Construction Specifications”, it shall be construed to mean the pertinent section of the City of Madison’s Standard Construction Specifications, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- B. Where reference is made to the “Standard Specifications”, it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the “State Specifications”, it shall be construed to mean the pertinent section of the WisDOT Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the “Geotechnical Report”, it shall be construed to mean the geotechnical report in Section 02 32 00.
- E. ASTM:
 - 1. ASTM D1557-78: Test Methods for Moisture-Density relation of Soil and Soil-Aggregate Mixtures Using 10 lbs. (4.54-kg) Rammer and 18-in. (457 mm) Drop.
 - 2. ASTM D698: Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbs/ft³ (600 kN-m/m³)).
 - 3. ASTM D1557: Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbs/ft³ (2,700 kN-m/m³)).
 - 4. ASTM D6938: In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

1.04 SUBMITTALS

- A. General: Submit the following in accordance with General Conditions of Construction Contract and Division 1 specification sections:
 - 1. Submit 50-pound samples of each type of aggregate to testing laboratory for materials not obtained from on-site stockpiles and for blended aggregate.
 - 2. Weight slips of each load showing the net weight of the aggregate.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Provide materials meeting the requirements of the Geotechnical Report and WisDOT Sections 301, 305, and 306 and as shown in the Drawings.
 - 1. Reclaimed or recycled asphalt products will not be an acceptable alternative or equal to 1¼-inch Dense Grade Base material.
- B. Hot-Mix Sand Asphalt Bases: Asphalt Institute Type VI, VII, or VIII Mixes for Hot-Mix Sand Asphalt Bases. Hot-mix base shall be used only under asphaltic concrete surfaces.

PART 3 EXECUTION

3.01 PREPARATION

- A. Prepare the subgrade in accordance with the Geotechnical Report and Section 31 20 00 - Earthmoving as necessary for undercut.

3.02 EQUIPMENT

- A. Meet requirements of WisDOT Section 301.3.1.

3.03 SPREADING AND SHAPING

- A. Meet requirements of WisDOT Section 305.3.4.
- B. Construct to thickness indicated on Construction Drawings. The minimum base thickness as shown on Drawings shall be achieved throughout all pavement areas.
 - 1. Aggregate Base: Apply in lifts or layers not exceeding 8 inches, measured loose.
 - 2. Sand Base: Apply in lifts or layers not exceeding 6 inches, measured loose.
 - 3. Hot-Mix Sand Asphalt Bases: Apply in lifts or layers not exceeding 3 inches, measured loose.

3.04 COMPACTION

- A. Meet requirements of WisDOT Section 305.3.2.2, except as modified below.
 - 1. Compact base material to not less than 98% of optimum density as determined by ASTM D698 or 95% of optimum density, as determined by ASTM D1557 unless otherwise indicated on the Drawings.

3.05 TOLERANCES

- A. Smoothness: Maximum variation of 3/8 inch when measured with a 10-foot straight edge.
- B. Compacted Thickness: within 1/4 inch.

3.06 FIELD QUALITY CONTROL

- A. Field inspection and testing will be done by the City/County in the public right-of-way or the Owner's Construction Representative.
- B. Repair or remove and replace unacceptable base course as directed by the Owner's Construction Representative.

END OF SECTION

**SECTION 32 12 16.13
PLANT-MIX ASPHALT PAVING**

PART 1 GENERAL

1.01 SUMMARY

- A. This section includes hot-mix asphalt paving, hot-mix asphalt patching, and pavement-marking paint.

1.02 RELATED WORK

- A. The following sections contain requirements that relate to this section:
 - 1. Section 31 20 00 - Earthmoving
 - 2. Section 32 11 23 - Aggregate Base Course

1.03 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM D1188 Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Coated Samples
 - 2. ASTM D2041 Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
 - 3. ASTM D2950 Density of Bituminous Concrete in Place by the Nuclear Methods
 - 4. ASTM D2726 Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixture
 - 5. ASTM D5444 Mechanical Size Analysis of Extracted Aggregate
- B. American Association of State Highway and Transportation Officials (AASHTO):
 - 1. AASHTO M017 Mineral Filler for Bituminous Paving Mixtures
 - 2. AASHTO M140 Emulsified Asphalt
 - 3. AASHTO M208 Cationic Emulsified Asphalt
 - 4. AASHTO M320 Performance-Graded Asphalt Binder
 - 5. AASHTO M323 Superpave Volumetric Mix Design
 - 6. AASHTO T164 Quantitative Extraction of Asphalt Binder from Hot-Mix Asphalt (HMA)
 - 7. AASHTO T166 Bulk Specific Gravity of Compacted Hot-Mix Asphalt Mixtures Using Saturated Surface-Dry Specimens
 - 8. AASHTO T209 Theoretical Maximum Specific Gravity and Density of Hot-Mix Asphalt (HMA)
 - 9. AASHTO T245 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
 - 10. AASHTO T275 Bulk Specific Gravity of Compacted Hot-Mix Asphalt Mixtures Using Paraffin-Coated Specimens
 - 11. AASHTO T308 Asphalt Content of Hot-Mix Asphalt (HMA) by the Ignition Method
 - 12. AASHTOT312 Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyrotory Compactor
 - 13. AASHTO T331 Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Automatic Vacuum Sealing Method
- C. National Asphalt Pavement Association (NAPA):
 - 1. IS 123 - Recycling Hot-Mix Asphalt Pavements
 - 2. IS 128 - HMA Pavement Mix Type Selection Guide

1.04 STANDARD SPECIFICATIONS

- A. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Wisconsin Department of Transportation (WisDOT) Standard Specifications for Road and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.

- B. Where reference is made to the "Geotechnical Report", it shall be construed to mean the geotechnical report in Section 02 32 00.
- C. All construction of public facilities and/or work within public lands or rights of way shall conform to the requirements and conditions of the City of Madison's Standard Specifications for Public Works Construction.

1.05 SUBMITTALS

- A. Job-Mix Designs for each job mix proposed for the work.
- B. Material Certificates, signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
- C. Load Tickets shall be submitted if payment is to be by tonnage.

1.06 DEFINITIONS

- A. Plant-Mix Asphalt Paving Terminology: Refer to ASTM D8 for definitions of terms.

1.07 SYSTEM DESCRIPTION

- A. Provide hot-mix asphalt paving according to materials, workmanship, and other applicable requirements of standard specifications of WisDOT.

1.08 QUALITY ASSURANCE

- A. Asphalt-Paving Publication: Comply with AI MS-22, "Construction of Hot-Mix Asphalt Pavements," unless more stringent requirements are indicated.
- B. Pre installation Meeting: Convene a pre installation meeting at the site at least two (2) weeks prior to commencing work of this Section. Require attendance of parties directly affecting work of this Section, including, but not limited to, Developer, Developer's Engineer and Inspector, Contractor, paving sub-contractor, and job foreman.
 - 1. Contact Developer' Engineer and the City/County three (3) weeks prior to pre-installation conference to confirm schedule.
 - 2. Record discussions of meeting and decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. Review foreseeable methods and procedures related to paving work, including the following:
 - a. Review preparation and installation procedures and coordinating and scheduling required with related work.
 - b. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - c. Tour, inspect and discuss condition of subgrade, drainage structures, and other preparatory work.
 - d. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - e. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - f. Review paving requirements (drawings, specifications, and other contract documents).
 - g. Review required submittals, both completed and yet to be completed.
 - h. Review required inspections, testing procedures.
 - i. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions.
 - j. Review safety precautions relating to placement of paving.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing Manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store pavement-marking materials in a clean, dry, protected location within temperature range required by Manufacturer. Protect stored materials from direct sunlight.

1.09 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp.
- B. Paving under conditions when surface temperatures approximately 3 feet above grade are at or below 40 deg F shall be in accordance with Cold Weather Paving provisions in the State Specifications; specifically, Section 450.
- C. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F. Paint color shall be as specified on the Drawings.

PART 2 PRODUCTS

2.01 GENERAL

- A. All materials and methods for on-site pavement shall conform to WisDOT Standard Specifications. Where conflicts between this specification and the WisDOT Standard Specifications exist, requirements of the WisDOT shall govern.
- B. All materials and methods for public roadways shall conform to City of Madison's Standard Specifications for Public Works Construction.

2.02 MATERIALS AND MIXES

- A. Provide asphaltic pavement per WisDOT Standard Specifications Sections 460.2 and 460.3 and the Pavement Design section of the Geotechnical Report but excluding limitations in Section 460.3.2 restricting layer thickness by aggregate size.
- B. Pavement thickness: See pavement sections in Drawings:
 - 1. Bituminous Concrete: Refer to Section 460-3
 - 2. Base Course: Refer to Section 301.3.4.2 - Standard Compaction
- C. Mixture Type: See Drawing sections, Table 460-2 of the WisDOT Standard Specifications
- D. Bituminous Material: Per WisDOT Standard Specifications, of suitable grade and consistency for application
- E. Tack Coat: Per WisDOT Standard Specifications, of suitable grade and consistency for application
- F. Water: Potable

2.03 MARKING MATERIALS

- A. Type S or Type N traffic paint in accordance with AASHTO Designation M248. Regular set drying time.
- B. Waterborne Paint: Paints shall conform to FS TT-P-1952.
- C. Solvent Borne Paint: Paint shall conform to FS A-A-2886 or AASHTO M248. Paint shall be non-bleeding, quick drying, and alkyd petroleum base paint suitable for traffic bearing surface and be mixed in accordance with manufacturer's instructions before application for colors White, Yellow, Blue, and Red.
- D. Epoxy marking from the WisDOT approved products list and in accordance with Section 646.2.4.
- E. Glass Beads: AASHTO M 247, Type 1 or FS TT-B-1325, Type 1, Gradation A.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to support paving and imposed loads.
- B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or that require further compaction per Geotechnical Report.

- C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.02 PATCHING

- A. Hot-Mix Asphalt Pavement: Sawcut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Tack Coat: Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
- C. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.03 SURFACE PREPARATION

- A. General: Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
 - 1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.
- B. Tack Coat: Apply uniformly to surfaces of existing pavement at a rate of 0.05 to 0.15 gal./sq. yd.
 - 1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - 2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.04 HOT-MIX ASPHALT PLACING

- A. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted.
 - 1. Place hot-mix asphalt binder course in number of lifts and thicknesses indicated.
 - 2. Spread mix at minimum temperature of 250 deg F.
 - 3. Begin applying mix along centerline of crown for crowned sections and on high side of one-way slopes, unless otherwise indicated.
 - 4. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.
- B. Place paving in consecutive strips not less than 10 feet wide unless in-fill edge strips of a lesser width are required.
 - 1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete a section of asphalt binder course before placing asphalt surface course.
- C. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.05 JOINTS

- A. Construct joints to ensure a continuous bond between adjoining paving sections. Construct joints free of depressions with same texture and smoothness as other sections of hot-mix asphalt course.
 - 1. Clean contact surfaces and apply tack coat to joints.

2. Offset longitudinal joints, in successive courses, a minimum of 6 inches. Coat longitudinal joints that are not completed before the previously laid mixture has cooled to a temperature below 140 deg F, with liquid asphalt just before paving is continued.
 3. Offset transverse joints, in successive courses, a minimum of 24 inches. If placing of material is discontinued or if material in place becomes cold, make a joint running perpendicular to the direction traveled by the paver. Before placement continues, trim the edge of the previously placed pavement to a straight line perpendicular to the paver and cut back to expose an even vertical surface for the full thickness of the course. When placement continues, position the paver on the transverse joint so that sufficient hot mixture will be spread in order to create a joint after rolling that conforms to the required smoothness. If the temperature of the previously placed pavement material drops below 140 deg F before paving is resumed, give the exposed vertical face a thin coat of liquid asphalt just before paving is continued.
 4. Construct transverse joints as described in AI MS-22, "Construction of Hot Mix Asphalt Pavements".
 5. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
 6. Compact asphalt at joints to a density within 2% of specified course density.
- B. Construction joints shall have same texture, density, and smoothness as other sections of asphalt concrete course.

3.06 COMPACTION

- A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.
1. Complete compaction before mix temperature cools to 185 deg F.
- B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
- C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
1. Average Density: 96% of reference laboratory density according to AASHTO T 245, but not less than 94% nor greater than 100%.
 2. Average Density: 92% of reference maximum theoretical density according to ASTM D2041, but not less than 92% nor greater than 97%.
- D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
- E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
- F. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked. Any masked or marred finish surfaces shall be repaired or smoothed.
- G. Compaction at Unsupported Edges of Pavements: Start the first roller pass 12 to 15 inches from the unsupported edge. Allow the uncompacted asphalt to act as a dike to hold the mat in place. The final pass over the uncompacted dike should not slough off if the roller is supported on the compacted mat.
- H. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- I. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

- J. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.07 INSTALLATION TOLERANCE

- A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - 1. Binder Course: $\pm 1/4$ inch.
 - 2. Surface Course: Plus (+) $1/4$ inch, no minus (-).
- B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:
 - 1. Binder Course: $1/4$ inch
 - 2. Surface Course: $1/8$ inch
 - 3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is $1/4$ inch.

3.08 FIELD QUALITY CONTROL

- A. Testing Agency: The Owner's Construction Representative will engage a testing agency to perform field tests and inspections and to prepare test reports.
 - 1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Thickness:
 - 1. In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D3549.
 - 2. Lot 2: The CTL will measure thickness of each core sample taken. At each core location, the thickness of the course shall meet or exceed the thickness shown. If the thickness of a lower course of asphalt is less than the thickness shown, it shall be identified as a deviation and recorded. The Contractor shall either remove and replace the deficient pavement or increase the thickness of the upper course so that the total thickness of the pavement meets or exceeds the design thickness, provided that the specified compaction of the lower lift is achieved.
- D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances. In areas of obvious depressions or bumps, suspect areas of each lift shall be checked with a 10'-0" straightedge both parallel with, and at right angles to, centerline of the paved area. The variation of the surface between two (2) contact points shall not exceed $1/4$ inch.
- E. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

3.09 SPLIT PAVING

- A. Where specified, paving of the binder course and surface course are to be performed in same construction seasons.
- B. If paving of binder and surface course are done in successive construction season, the Contractor shall be responsible for damage to the binder course and curbs until the surface course is placed and accepted by the Owner as appropriate.

3.10 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
- B. Do not allow excavated materials to accumulate on-site.

3.11 MARKING APPLICATION - PAINT

- A. Pavement markings shall be placed at locations and to dimensions shown on Drawings.
- B. Applied lines shall have a uniform cross section.
- C. Lines shall have sharp cut-off defined edges on both side and ends.
- D. Pavement markings applied to new asphaltic pavement surfaces shall be applied to surface course within seven (7) days of placement.
- E. Pavement markings applied to new concrete surfaces shall be applied prior to allowance of any traffic on surface.
- F. Agitate paint for 5-10 minutes prior to application to ensure even distribution of paint pigment.
- G. Paint shall be applied in accordance with manufacturer's recommendations and apply two coats of same color of paint as specified without addition of thinner, with maximum of 100 square feet per gallon or as required to provide a minimum wet film thickness of 15 mils and dry film thickness of 7½ mils per coat.
- H. Dispense paint at ambient degrees Fahrenheit to wet-film thickness of 15 mils.
- I. Apply markings to indicated dimensions at indicated locations.
- J. Prevent splattering and over spray when applying markings.
- K. Apply glass beads at pedestrian crosswalk striping and at lane striping and arrows at driveways connecting to public streets. Broadcast glass beads uniformly into wet markings at a rate of 6 lbs./gal.
- L. Unless material is track free at end of paint application convoy, use traffic cones to protect markings from traffic until track free. When vehicle crosses a marking and tracks it or when splattering or over spray occurs, eradicate affected marking and resultant tracking and apply new markings.
- M. Collect and legally dispose of residues from painting operations.

3.12 MARKING APPLICATION - EPOXY

- A. Application shall be in accordance with Section 646.3.3.2 of the State Specifications.

END OF SECTION

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SECTION 32 14 13.19
PERMEABLE ARTICULATING CONCRETE BLOCK (P-ACB)

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Permeable Articulating Concrete Block (P-ACB)
 - 2. Open-Graded Aggregate Subbase
 - 3. Transition and Edge Restraints
 - 4. Geosynthetics
- B. Related sections:
 - 1. Section 31 20 00 – Earthmoving
 - 2. Section 31 22 16.15 – Subgrade Preparation
 - 3. Section 32 16 00 – Concrete Pavement, Curb and Sidewalks
 - 4. Section 33 40 00 – Storm Sewer Construction

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. ASTM C33 – Standard Specification for Concrete Aggregates
 - 2. ASTM D75 – Standard Practice for Sampling Aggregates
 - 3. ASTM C136 – Standard Test Method for Sieve Analysis for Fine and Coarse Aggregate
 - 4. ASTM C140 – Methods of Sampling and Testing Concrete Masonry and Related Units
 - 5. ASTM C150 – Standard Specification for Portland Cement
 - 6. ASTM D448 – Standard Classification for Sizes of Aggregate for Road and Bridge Construction
 - 7. ASTM C618 – Standard Specification for Coal Fly Ash for Use in Concrete
 - 8. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
 - 9. ASTM C1781 – Standard Test Method for Surface Infiltration Rate of Permeable Unit Pavement System
 - 10. ASTM D6684 – Standard Specification for Materials and Manufacture of Articulating Concrete Block (ACB)
- B. American Association of State Highway and Transportation Office (AASHTO) H-20, HS-20, HS-25 - Highway Truck Load Rating
- C. PaveDrain Installation Manual
- D. PaveDrain Maintenance Manual
- E. www.pavedrain.com

1.03 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment, and incidentals required per Manufacturers' Installation Manual.
- B. The Contractor shall perform all operations in connection with the installation of the P-ACBs in accordance with the aggregates, grades, design and dimensions shown on the Contract Documents, manufacturers' installation manual and specified herein.

1.04 SUBMITTALS

- A. Shop Drawings: Submit design details, unit details, cross-sections and layouts as per Contract Documents to Engineer of Record (EOR).
- B. Samples:
 - 1. Natural Gray: Submit one (1) full-sized P-ACB sample.
 - 2. Color: Submit 4" x 4" samples representative of color(s) selected within this specification or noted on Contract Documents.
 - 3. Minimum 3-pound samples of proposed subbase and/or base aggregate materials.

- C. Geosynthetic: Submit product data sheet(s) and test reports for geosynthetic(s) proposed for use by EOR within this specification or on Contract Documents.
- D. Submit to the EOR manufacturers' printed installation manual, literature, layout drawings, and product specifications.
- E. Certification of Compliance:
 - 1. Test Reports - Indicate compliance with requirements of Contract Documents, including:
 - a. P-ACB unit compressive strength, moisture content and density on like units, tested in accordance to ASTM C140 by independent laboratory per unit requirements of ASTM D6684, Table 1.
 - b. Sieve analysis of all aggregate grades indicated in Contract Documents, sampled according to ASTM D75 and tested in accordance to ASTM C136.
 - c. Specified standard sizes of coarse aggregates shall comply with sizes given in accordance to ASTM D448, Table 1.
 - 2. Performance Compliance – Indicate compliance with requirements of Contract Documents, including:
 - a. **Infiltration Performance** - Submit independent laboratory test report indicating in-place infiltration performance of: Average of three (3) tests of 1,000 inches per hour (in./hr.). Test shall be performed in accordance to ASTM C1781 or C1701 and based on an outdoor working surface with typical base material and installation.
 - b. **Structural Performance** - Design of the P-ACB shall be capable of supporting AASHTO H-20, HS-20, and HS-25 truck loading with proper subgrade and base installation. The P-ACBs shall be analyzed as unreinforced concrete arches supporting a uniform truck tire load with impact per AASHTO standards as tested by an independent laboratory.
 - c. **Maintainability** - Provide maintenance study based on at least 24 months by an independent or third-party representative which includes pre- and post-infiltration testing documentation in multiple locations in accordance with ASTM C1781 or C1701. The study shall show that after manufacturers' recommended maintenance that the original infiltration performance of the permeable system can effectively be restored to 80% ±10% of initial infiltration rates.
- F. Substitutions:
 - 1. Manufacturer's requesting to submit materials as equivalent must provide records, data, independent laboratory test results, samples, certifications, and documentation meeting all areas of this specification without exception. Any requests must be submitted to EOR 15 days prior to bid date.

1.05 SCHEDULING

- A. Contractor shall contact P-ACB manufacturer to determine necessary lead time to produce unit material order.
- B. Schedule manufacture and delivery of P-ACBs to coincide with construction schedule to prevent storage for extended periods.
- C. Approximately two (2) weeks prior to the start of the installation, a preconstruction meeting shall occur with representative(s) from the design team, general contractor, site contractor, installation contractor and manufacturers' representative.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. P-ACB individual blocks must be delivered on wooden pallets and marked accordingly.
- B. All P-ACBs shall be sound and free of defects that would interfere with proper placement or that would impair the strength or longevity of the installation.
- C. Minor cracks incidental to the usual method of manufacture; scuffing or chipping that results from customary methods of handling in shipping, delivery and placement shall not be deemed grounds for rejection.

PART 2 PRODUCTS**2.01 MANUFACTURED PERMEABLE ARTICULATING CONCRETE BLOCK (P-ACB)****A. PaveDrain® P-ACB:**

1. Color(s): Color to be selected by Owner. Contractor to provide color samples of amicable products.
2. Type: Closed-cell pre-manufactured individual concrete blocks, solid block type (non-arch) per Contract Documents. Blocks may be hand-placed or mechanically installed.
3. Physical and Performance Requirements: At the time of delivery to the work site, the units shall conform to the requirements prescribed in Table 1 below.
4. PaveDrain solid block to be used. Arch Block not permitted.

Table 1: Physical & Performance Characteristics

Item	Description	Values
Dimensional Tolerance	Length x Width x Height ASTM D6684 Section 5.3.2	12" x 12" x 5.65" (+/- 1/8")
Compressive Strength	ASTM D6684 / ASTM C140	Avg. of three units: 4,000 psi min. Individual units: 3,500 psi min.
Block Unit Weight		Solid Block: 55-60 lbs./SF
Loading Capabilities	Truck Load Traffic Rating	AASHTO H-20, HS-20, HS-25
Joint Filler Between Blocks	Material Used	NONE Required
Percent Open Space		Surface: 7% Storage: 20%
Water Absorption (Max. %)	ASTM D6684 Table 1/ ASTM C140	Avg. of three units: 9.1% lbs./ft ³ Individual units: 11.7% lbs./ft ³
Density (Min. lb./ft ³)		Avg. of three units: 130 lbs./ft ³ Individual units: 125 lbs./ft ³
Storage Capacity	Above Aggregate Within Arch	0.0833 CF/block
Post-Installation, Verified Surface Infiltration Rates	ASTM C1781 Test Method	Avg. of three tests: 1,000 in./hr. min.

B. Acceptable manufacturers and distribution partners:

1. **Local** – PaveDrain, LLC, (888) 575-5339, info@pavedrain.com, www.pavedrain.com
2. **National** – PaveDrain, LLC, (888) 575-5339, info@pavedrain.com, www.pavedrain.com
3. **Manufacturer** – PaveDrain, LLC, (888) 575-5339, info@pavedrain.com, www.pavedrain.com

2.02 AGGREGATE MATERIALS

- A. Open-Graded Coarse Aggregate:** Select coarse aggregate shall be clean material free from organic materials and angular on all sides. Select coarse aggregate shall meet the gradations that are listed in Table 1 of ASTM D448 and based on sieve analysis in accordance to ASTM C136. Recycled aggregate material is NOT allowed within the top 4- to 6-inch elevation directly contacting the bottom of the PaveDrain units.

1. Bidding Course Aggregate: ASTM Grade #57 stone shall be used as the finish (top) 4- to 6-inch layer of stone directly underneath the PaveDrain units.
 - a. ASTM #57: Stone Gradation (Percent Passing)
 - 1) 1½-inch Sieve – 100%
 - 2) 1-inch Sieve – 95% to 100%

- 3) 1/2-inch Sieve – 25% to 60%
 - 4) No. 4 Sieve – 0 to 10%
 - 5) No. 8 Sieve – 0 to 5%
2. Storage Reservoir Aggregate: ASTM Grade #2, as approved by engineer of record, thickness as indicated by cross-sections on the shop drawings and/or Contract Documents.
- a. ASTM #2: Stone Gradation (Percent Passing):
 - 1) 3-inch Sieve – 100%
 - 2) 2½-inch Sieve – 90% to 100%
 - 3) 2-inch Sieve – 35% to 70%
 - 4) 1½-inch Sieve – 0 to 15%
 - 5) 3/4-inch Sieve – 0 to 5%

2.03 TRANSITION AND EDGE RETRAINTS

- A. Transition: Utilize PaveDrain end block, solid block and half block shapes to make smooth transitions with curbs and other rigid surfaces as per shop drawings and/or Contract Documents.
- B. Edge Restraint: Type and dimensions shall be indicated by EOR as per shop drawings and/or Contract Documents.

2.04 GEOSYNTHETIC MATERIALS

- A. Geotextile: Mirafi RS380i (or approved equal), a high strength, high water flow, woven monofilament or multifilament geotextile as specified by EOR based on native soil properties.
- B. Geogrid: Tensar BX-1100 (or approved equal) as specified by EOR based on native soil properties.

2.05 PAVER BLOCK SEALANT

- A. Contractor to provide ProSpec Salt Barrier (or approved equal) for surface sealant of paver blocks for protection against salts and de-icing chemicals.

PART 3 EXECUTION

3.01 EXAMINATION AND INSPECTION

- A. The Contractor shall verify that the subgrade has been excavated, shaped, stabilized and compacted in accordance to Sections 31 22 00, 31 23 00, 31 32 00, and 31 34 00 and conforms to the lines, grades and cross-sections shown on Contract Documents.
- B. Verify that native subgrade has been compacted to a maximum of 95% Modified Proctor in accordance to ASTM D1557. Do not over-compact or rut native subgrade.
- C. Immediately prior to placing the PaveDrain units, the final prepared sub-base aggregate shall be inspected by the EOR and witness to a proof roll test by a fully loaded dump truck. Unsatisfactory conditions must be corrected prior to installation of the PaveDrain units.

3.02 GEOSYNTHETIC INSTALLATION

- A. Geotextile: The Contractor shall place Mirafi RS380i (or approved equal) woven monofilament or multifilament geotextile flat on subgrade and vertical sections of base aggregate free of wrinkles and overlapping a minimum of 24 inches.
- B. Geogrid: Install Tensar BX-1100 (or approved equal) directly on top of properly prepared and leveled final aggregate base.

3.03 STORAGE RESERVOIR AGGREGATE

- A. The thickness of the subbase, requirement of multiple gradations of open-graded coarse aggregate and intermediate geosynthetic shall be indicated by the EOR and detailed on the Contract Documents. The minimum thickness of open-graded coarse aggregate is 6 inches. If more than 6 inches of base aggregate is required, only the top 4 to 6 inches shall be ASTM Grade #57.
- B. All base aggregates shall be compacted in 6- to 8-inch lifts with a roller compactor and final grade level compacted with a minimum 10,000 lb. vibratory plate compactor in with at least two passes in both the perpendicular and parallel directions. Open-graded base aggregate installation shall not damage or dislodge the geotextile.
 - 1. When using multiple aggregate layers including ASTM #2, #3, or #4, the Contractor shall compact a 2-inch layer of ASTM #57 into ASTM #2, #3, or #4.
- C. Finished grade shall be a smooth, plane surface with no sign of movement and conform to the lines, grades, and cross-sections shown on Contract Documents.

3.04 PAVEDRAIN PERMEABLE ARTICULATING CONCRETE BLOCK INSTALLATION

- A. Refer to PaveDrain Installation Manual (latest edition).
- B. Hand or Mechanical Placing PaveDrain Units:
 - 1. The Contractor shall determine the best starting point of the PaveDrain unit installation to conform to the lines, grades, and elevations shown on the Contract Documents.
 - 2. Place PaveDrain units tight together in running bond pattern such that one unit is directly in contact with one half of the two adjacent units. Place units in such a manner as to ensure that the pattern remains square to curbs, transitions, or adjacent pavements.
 - 3. Verify that each PaveDrain unit makes contact with the geogrid or open-graded aggregate subbase and is tightly engaged with adjacent units.
 - 4. When necessary, make partial units from saw cutting solid, arch-less PaveDrain units. Transitions against curbs and other rigid pavements should be made with maximum 1/2-inch gaps utilizing solid, end, and half PaveDrain units.
- C. Adjustments:
 - 1. Minor adjustments to properly engage PaveDrain units shall be made with a dead blow hammer or rubber mallet.
 - 2. Once all PaveDrain units have been installed, minor differential heights between units can be corrected with a small non-vibratory single or double barrel roller compactor or vibratory plate compactor. When using plate compactor, protect units with non-woven geotextile or mat to eliminate scuffing.
 - 3. Inspect completed installation and replace any cracked or damaged units.

3.05 TOLERANCES

- A. No individual PaveDrain unit shall protrude more than 1/4 inch within the plane of final placed units/mats.
- B. No gap between the individual PaveDrain units shall exceed 1/2 inch.

3.06 FINISHING

- A. The joints between the PaveDrain units **DO NOT** require backfilling with smaller aggregate joint material or sand in order to function properly. **The joints are designed to be left open; this includes following maintenance of the PaveDrain system.**

3.07 POST-INSTALLATION CERTIFICATION

- A. Upon completion of the PaveDrain installation, the surface infiltration rate of the permeable pavement area shall be verified in accordance with ASTM C1781 or C1701 to confirm the required infiltration rate as per Table 1 in this specification.
- B. If the system fails to perform as required in Table 1 of this specification, it shall be removed and replaced at the supplier's expense.

- C. The expenses associated with this post installation infiltration verification are included in the cost of the permeable system and provided by the supplier.

3.08 PAVER BLOCK SEALANT

- A. Upon completion of post-installation certification, Contractor shall apply ProSpec Salt Barrier (or approved equivalent) paver block sealant per the manufacturer's recommendations.
- B. Refer to manufacturer's installation and maintenance guidelines.

3.09 INSPECTION AND MAINTENANCE OF P-ACB SYSTEM

- A. Refer to: PaveDrain Maintenance Manual (latest edition)
- B. Maintenance shall be required when either of the following two conditions are met:
 - 1. The surface infiltration rates of more than 75% of the total permeable surface falls below 10% of the rate required in Table 1.
 - 2. Surface ponding remains for 24 hours in an area greater than 10 square feet of the permeable surface.

END OF SECTION

SECTION 32 16 00
CONCRETE PAVEMENT, CURB AND SIDEWALKS

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Portland cement concrete pavements, curbs, gutters, and sidewalks, except sidewalks on structural footings and stoops and/or specified by the architectural or structural drawings.
- B. Related requirements:
 - 1. Section 02 32 00 - Geotechnical Investigation
 - 2. Section 31 20 00 - Earthmoving
 - 3. Section 31 22 16.15 - Subgrade Preparation
 - 4. Section 32 11 23 - Aggregate Base Course

1.02 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. American Concrete Institute (ACI):
 - 1. ACI 305R Hot Weather Concreting
 - 2. ACI 306R Cold Weather Concreting
 - 3. ACI 306.1 Cold Weather Concreting
 - 4. ACI 308 Curing Concrete
- C. ASTM International (ASTM):
 - 1. ASTM A185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
 - 2. ASTM A615 Deformed and Plain Billet-Steel for Concrete Reinforcement
 - 3. ASTM C31 Making and Curing Concrete Test Specimens in the Field
 - 4. ASTM C39 Comprehensive Strength of Cylindrical Concrete Specimens
 - 5. ASTM C42 Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - 6. ASTM C94 Ready-Mixed Concrete
 - 7. ASTM C138 Test Method for Unit Weight, Yield, and Air Content (Gravimetric) of Concrete
 - 8. ASTM C143 Slump of Hydraulic Cement Concrete
 - 9. ASTM C231 Air-Content of Freshly Mixed Concrete by the Pressure Method
 - 10. ASTM C172 Sampling Freshly Mixed Concrete
 - 11. ASTM C173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
 - 12. ASTM C260 Air-Entraining Admixtures for Concrete
 - 13. ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete
 - 14. ASTM C618 Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
 - 15. ASTM C989 Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
 - 16. ASTM C1064 Temperature of Freshly Mixed Portland Concrete Cement
 - 17. ASTM C1218 Water-Soluble Chloride in Mortar and Concrete
 - 18. ASTM D98 Calcium Chloride
 - 19. ASTM D994 Preformed Expansion Joint Filler for Concrete (Bituminous)
 - 20. ASTM D1190 Concrete Joint Sealer, Hot Poured, Elastic Type
 - 21. ASTM D1751 Performed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types)
 - 22. ASTM D2628 Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
- D. Federal Specifications (FS):
 - 1. FS HH-F-341 Fillers, Expansion Joint: Bituminous (Asphalt and Tar)

E. Wisconsin Department of Transportation (WisDOT):

1. State of Wisconsin Standard Specifications for Highway and Structure Construction, latest edition.

1.03 SUBMITTALS

A. Mix Design:

1. Fill out and submit attached Concrete Mix Design Submittal Form.
2. Submit three (3) copies of each proposed mix.
3. Submit separate mix design for concrete to be placed by pumping in addition to the mix design for concrete to be placed directly from the truck chute.
4. Include applicable information shown on the Mix Design Submittal Form and the following:
 - a. Proportions of cementitious materials, fine and coarse aggregate, and water.
 - b. Water-cementitious material ratio, 28-day compressive design strength, slump, and air content.
 - c. Type of cement, fly ash, slag and aggregate.
 - d. Aggregate gradation.
 - e. Type and dosage of admixtures.
 - f. Special requirements for pumping.
 - g. Range of ambient temperature and humidity for which design is valid.
 - h. Special characteristics of mix which require precautions in mixing, placing, or finishing techniques to achieve finished product specified.
 - i. Materials and methods for curing concrete.

B. Submit certified laboratory test data or manufacturer's certificates and data for the items listed below certifying that materials are in conformance requirements specified herein. Submit to the Engineering Consultant of Record and the Construction Testing Laboratory for review and approval and within seven calendar days after receipt of Notice to Proceed.

1. Concrete mix design(s)
2. Type and source of Portland cement, fly ash, and slag
3. Aggregate gradations
4. Preformed expansion joint filler
5. Field molded/poured sealant
6. Dowel bars
7. Expansion sleeves
8. Tie bars
9. Reinforcing steel bars
10. Welded wire fabric
11. Air entraining admixtures
12. Water-reducing, set-retarding and set-accelerating admixtures (if used)

C. Test Reports: Submit field quality control test reports.

1.04 PROJECT CONDITIONS

- A. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Forms shall be of wood or metal and shall be straight and of sufficient strength to resist springing, tipping or other displacement during the process of depositing and consolidating the concrete. If of wood, forms shall be surfaced plank of at least 2-inch nominal thickness stock except for sharply curved sections; and if of metal, they shall be of approved section. The forms shall be of the full depth of the required curb or curb and gutter, driveway or sidewalk sections and shall be designed to permit secure fastening. Face boards, if used, shall be so constructed and shaped that their lower edge conforms to the lines and radius indicated by the cross section for the pertinent structure as shown on the plans. Flexible or curved forms of proper radius shall be

used for curves of 100-foot radius or less. All forms shall be cleaned thoroughly and oiled before the concrete is placed against them.

- B. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A185 and AASHTO M31 Grade 60. Furnish in flat sheets.
- C. Reinforcing Steel: Deformed steel bars, ASTM A615, Grade 60.
- D. Epoxy Coating: ASTM A775 where noted in the Drawings.
- E. Portland Cement: Shall conform to ASTM C150, Type I unless Type III is specified.
- F. Exterior Pavement Joint Materials:
 - 1. Preformed Expansion Joint Filler shall be 3/4 inch in thickness and shall conform to AASHTO M-213.
 - 2. Joint Back-up Material: Polyethylene foam, 100% closed cell.
 - 3. Sealant:
 - a. Dow 888 by Dow Corning
 - b. 301 NS by Pecora
 - c. Spectrum 800 or 900 by Tremco
- G. Aggregate: ASTM C33.
- H. Water: Clean and potable.
- I. Dowel Bars: ASTM A615, Grade 60, and plain steel bars.
- J. Air Entrainment:
 - 1. Air entrained concrete shall be used for all concrete construction. Slip formed concrete pavement shall contain 7.0% air, $\pm 1.5\%$. Other concrete shall contain 6.0% air, $\pm 1.5\%$.
 - 2. ASTM C260:
 - a. Air-Mix or AEA-92 by Euclid Chemical Corp.
 - b. MB-VR MB-AE 90, or Micro-Air, by BASF
 - c. Daravair or Darex Series by W.R. Grace
 - d. Equivalent approved products
- K. Liquid Membrane Curing and Sealing Compound: ASTM C1315, Type I, Class A or Class B, 25% minimum solids content, clear non-yellowing with no styrene-butadiene. Specifications for Liquid Membrane-Forming Compounds for Curing Concrete, AASHTO M-148, Type 2, shall also apply if more stringent.
 - 1. Water Based - VOC less than 360 g/l:
 - a. Super Acua Cure by Euclid Chemical Group
 - b. Kure 1315 by BASF
 - 2. Solvent Based:
 - a. Super Rez-Seal by Euclid Chemical Group
 - b. Kure-N-Seal 30 by BASF
- L. Polyethylene Sheeting: Polyethylene sheeting for curing concrete shall conform to the requirements for white opaque polyethylene film of the Specification for Sheet Materials for Curing Concrete, AASHTO M-171.

2.02 CONCRETE MIXING

- A. Mix concrete and deliver in accordance with ASTM C94. Design mix shall produce normal weight concrete consisting of Portland cement, supplementary cementitious materials, aggregates, admixtures and water to produce the following:
 - 1. Compressive Strength: 3,500 psi minimum at 28 days unless otherwise indicated on the Drawings
 - 2. Slump Range: 2 to 4 inches for hand placed concrete, 1¼ to 3 inches for machine placed (slip-form) concrete

B. Supplementary Cementitious Materials (SCM):

1. Concrete mix shall contain SCM at the amounts specified unless other amounts are approved by the Owner's Civil Engineer. Either fly ash or ground granulated blast furnace slag (GGBFS) may be used for the SCM, but shall not be used together to form a ternary mix. Use of fly ash or GGBFS in the concrete mix is mandatory.
2. Fly Ash:
 - a. Substitute fly ash for Portland cement at 15 percent (15%) of the total cementitious content. ASTM C618, Class C.
 - b. Use only one (1) type and source throughout project.
3. Ground Granulated Blast Furnace Slag (GGBFS): Substitute GGBFS for Portland cement at 20% of the total cementitious content.
 - a. If required to mitigate potential sulfate exposure or aggregate reactivity, up to 50 percent (50%) substitution of Portland cement is allowed.
 - b. ASTM C989, Grade 100 or 120. Use only one (1) type and source throughout project.
4. Maintain air-entrainment at specified levels.

C. Calcium chloride:

1. Not allowed.

PART 3 EXECUTION

3.01 PREPARATION

- A. Begin paving work only after unsuitable areas have been corrected and are ready to receive paving.
- B. Remove loose material from compacted base material surface to produce firm, smooth surface immediately before placing concrete.

3.02 INSTALLATION

A. Form Construction:

1. Set forms to required grades and lines, rigidly braced and secured.
2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place minimum of 24 hours after concrete placement.
3. Check completed formwork for grade and alignment to following tolerances:
 - a. Top of forms not more than 1/8 inch in 10'-0"
 - b. Vertical face on longitudinal axis, not more than 1/4 inch in 10'-0"
4. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.

- B. Reinforcement: Fasten reinforcing bars or welded wire fabric (if required) accurately and securely in place with suitable supports and ties. Remove from reinforcement all dirt, oil, loose mill scale, rust, and other substances that will prevent proper bonding of the concrete to the reinforcement.

C. Concrete Placement:

1. Concrete shall be mixed and placed when the air temperature in the shade and away from artificial heat is a minimum of 35 degrees F (35°F) and rising.
2. Hot and cold weather concreting shall be in accordance with ACI 305R (hot weather) and 306.1 and 306R (cold weather). Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until set at required finish elevation and alignment.
3. Place concrete using methods that prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

4. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place construction joint. Automatic machine may be used for curb and gutter placement. Machine placement shall be at required cross section, line, grade, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified herein.
- D. Joint Construction:
1. Contraction Joints: Construct concrete curb or combination concrete curb and gutter, where specified on Construction Drawings, in uniform sections of length specified on Construction Drawings. Form joints between sections either by steel templates, 1/8 inch in thickness, of length equal to width of curb and gutter, and with depth which will penetrate at least 2 inches below surface of curb and gutter; or with 3/4-inch thick performed expansion joint filler cut to exact cross section of curb and gutter; or by sawing to depth of at least 1/4 of the poured thickness of concrete while concrete is between 4 and 24 hours old. If steel templates are used, they shall be left in place until concrete has set enough to hold its shape, but shall be removed while forms are still in place. Contraction joints in concrete curb and gutter shall be at a maximum spacing of 10-foot. Contraction joints in concrete sidewalk or pavement shall be spaced at a length to width ratio not exceeding 1.5:1, with no dimension greater than 15 feet unless approved by the engineer.
 2. Longitudinal Construction Joints: Tie concrete curb or combination concrete curb and gutter, where specified on Construction Drawings, to concrete pavement with 1/2-inch round deformed reinforcement bars of length and spacing shown on Construction Drawings.
 3. Transverse Expansion Joints: Concrete curb, combination concrete curb and gutter, or concrete sidewalk shall have filler cut to exact cross section of curb, gutter, or sidewalk. Joints shall be similar to type of expansion joint used in adjacent pavement. Expansion joints to be located at high points, utility structures, curb returns, cold joints, or 100-foot maximum spacing.
- E. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. Furnish joint fillers in one piece lengths for full width being placed, wherever possible. Where more than one length is required, lace, or clip joint filler sections together.
- F. Joint Sealants: Install in accordance with manufacturer's recommendations.

3.03 CONCRETE FINISHING

- A. After striking off and consolidating concrete, smooth surface by screeding and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10'-0" straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide continuous smooth finish.
- B. Work edges of sidewalks, gutters, back top edge of curb, and formed joints with edging tool, rounding edge to 1/2-inch radius. Eliminate tool marks on concrete surface. After completion of floating and trowelling, when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
1. Curbs, gutters, and sidewalks: Broom finish by drawing fine-hair broom across surface perpendicular to flow of traffic. Repeat operation as necessary to produce fine line texture.
 2. Concrete Pavement: Broom finish by drawing medium-hair broom across surface parallel to direction of vehicle traffic. Repeat operation as necessary to produce even textured finish.
- C. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up minor honeycombed areas. Remove and replace areas or sections with major defects as directed by Developer.
- D. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable work as directed by Developer.

3.04 NIGHT CONCRETING

- A. Concreting operations shall be discontinued due to insufficient natural light, unless an adequate and approved artificial lighting system is provided and operated.

3.05 CURING AND PROTECTION

- A. Protect and cure finished concrete paving using curing compound or with acceptable moist-curing methods in accordance with "water-curing" section of ACI 308. Cure for a period not less than seven days.
- B. Use solvent based curing compound when compound is applied below 40 degrees F (40°F).

3.06 BACKFILL

- A. After concrete has set sufficiently, spaces on either side of concrete pavements, by curb, combination concrete curb and gutter, or concrete sidewalk shall be refilled to required elevation with suitable material compacted in accordance with WisDOT Standard Specifications Section 02300.

3.07 CLEANING AND PROTECTION

- A. Sweep concrete pavement and wash free of stains, discolorations, dirt, and other foreign material just prior to final inspection.
- B. Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials.

3.08 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Owner's Construction Representative in accordance with Division 1 and this section. Other field quality control testing and inspection shall be at the discretion of the Contractor as necessary to assure compliance with Contract requirements.

END OF SECTION

**SECTION 321723
PAVEMENT MARKINGS**

PART 2 PRODUCTS

END OF SECTION

**SECTION 32 18 13
SYNTHETIC TURF SAFETY SURFACE**

PART 1 GENERAL

1.01 SUMMARY

- A. Provide all labor, materials, equipment, and tools necessary for the complete installation of a synthetic grass playground safety surface system as outlined in these specifications. The vertical draining impact attenuating layer shall be suitable to meet safety standards for the fall height of the intended equipment. The stone base, nail board, and drainage system may be provided separately by the Owner or an approved Contractor. The system shall consist of, but not necessarily be limited to, the following:
1. A complete synthetic grass system, consisting of a synthetic grass with a pile height of at least 1-1/8 inches long and not to exceed 1-3/8 inches long, 100% monofilament polyethylene fibers and polyethylene/polyester thatch layer, tufted on a 3/8-inch tufting machine with a minimum face weight of 80 ounces of yarn per square yard. The fibers shall include antistatic yarns and antibacterial additives. Synthetic turf products utilizing nylon blades or nylon thatch layers will not be acceptable. The system should be infilled with between 2.0 pounds per square-foot of acrylic coated sand (commonly known as T°Cool®) infill or a combination thereof as accepted by the managing architect. Systems utilizing granular rubber products made of recycled tires infilled in the grass blades will not be acceptable. The system shall include a single, dimensionally stable, two-component primary backing and have a minimum of 18 ounces of secondary polyurethane backing per square yard. The finished product shall also include perforations in a 3-inch by 4-inch pattern to ensure excellent surface drainage.

1.02 QUALIFICATIONS, REFERENCES AND SUBMITTALS

- A. Prospective bidders and/or installers of the turf shall be required to comply with the following:
1. The turf manufacturer must be experienced in the manufacture of synthetic grass playground systems with antistatic and antibacterial properties and provide references of five (5) municipal or commercial playground installations in the last three (3) years.
 2. The turf installer must provide competent workmen skilled in this specific type of synthetic grass installation. The designated supervisory personnel on the project must be competent in the installation of this material, including gluing of seams.
 3. The turf installer will provide submittals of turf, shock pad, glue, and seam materials as detailed in the submittals section of the specifications. These details should include the following ASTM test method for the complete system.
 - a. ASTM F1292-17a: Standard Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment
 - b. ASTM F1951-14: Standard Specification for Determination of Accessibility of Surface Systems Under and Around Playground Equipment
 4. Submit one (1) 12-inch by 12-inch sample of the synthetic turf and the underlayment padding to be installed. A submission of at least one pound of the infill material to be used is also required.
 5. Submit manufacturer's certification that the products and materials comply with the requirements of these specifications. Submit test results showing compliance with the reference standards as listed in the Specifications.
 6. Documentation: Submit warranty and ensure that forms have been completed in Owner's name and registered with approved manufacturer. The installer of the infill turf system must accept the aggregate base as completed to standards prior to installation of the synthetic turf system.

PART 2 - SYNTHETIC GRASS MATERIALS

2.01 MANUFACTURERS

- A. Approved synthetic turf products are:
1. PerfectPlay® Playground Safety Surface
 - a. Manufactured by Perfect Turf LLC, Rolling Meadows, IL 60008 Contact: 888-SYN-TURF (888-796-8873)
 2. The PerfectPlay® System consist of:
 - a. Perfect Turf® PlayGround Turf 80™ and Perfect Turf PlayGround Turf Colors™ (see addendum for specification pages)
 - i. Face Weight: 80 ounces
 - ii. Pile Height: 1.25 inches
 - iii. Roll Width: 15 feet (180 inches)
 - iv. Yarn Color: Two-tone green with green/tan thatch, light blue, red, white and yellow
 - v. Yarn Type: 8,000 denier, two-tone polyethylene blades with a 5,000 denier, texturized polyethylene thatch layer. PlayGround Turf 80™ yarn is manufactured to include antimicrobial additives and antistatic properties
 - vi. Construction Details: Type: Tufted Gauge: 3/8 inch
 - vii. Primary Backing: 9.1 ounces, stabilized, multi-layered, knitted polyethylene with 5 pic Action Bac
 - viii. Secondary Backing: 18.0 ounces, polyurethane coating
 - ix. Perforation: 3" x 4" on center
 - x. Infill Requirements: 2 pounds/square-foot of infill based on customer preference
 - xi. Warranty: 10-year manufacturer's warranty
 - b. Perfect Turf® Playground Padding (manufactured by Schmitz Foam) or Perfect Turf Unitary Base as manufactured by Pro-Techs Surfacing or approved poured in place rubber manufacturer
 3. Or approved equivalent upon approval from the principal architect.
- B. The synthetic turf material shall be in accordance with the following:
1. The long fiber shall be a minimum 8,000 denier, minimum 240-micron thickness, 100% true monofilament polyethylene, low friction fiber, measuring not less than 1-1/8 inches high and not more than 1-3/8 inches high. The thatch fiber shall be a minimum 4,000 denier, minimum 140-micron thickness, 100% polyethylene and polyethylene fiber. These material specifications will be confirmed by providing the following independent lab testing:
 - a. ASTM D1577: Standard Test Method for Linear Density of Yarn by the Short Method (Denier)
 - b. ASTM D3218: Standard Specification of Polyolefin Monofilaments (Ribbon Thickness & Width)
 - c. ASTM D5823: Standard Test Method for Tuft Height of Pile Yarn Floorcoverings
 2. The polyester in the thatch zone fiber is required for antistatic properties. The silver-oxide based antimicrobial additives in the yarn are designed to keep the surface more sanitary for children. Any synthetic turf without these properties built into the yarn will not be acceptable. Infills and/or sprays designed to provide these properties will not be acceptable.
 3. The PlayGround Turf 80™ fiber must be a two-tone grass blade, green in color, with a tan/green thatch fiber to simulate natural grass as closely as possible and treated with UV inhibitor, guaranteed for a minimum of ten (10) years. The PlayGround Turf 80 Colors™ will be either all yellow, all red, all white, or all blue, meaning the long blades and the thatch blades are all the same color.

4. The tufted fiber weight, or face weight, should not be less than 80 ounces per square yard. The fiber must be tufted on a 3/8-inch tufting machine. The low friction non-abrasive fiber must be 100% monofilament polyethylene, treated with a UV inhibitor. These material specifications will be confirmed by independent lab testing:
 - a. ASTM D5848-10e1: Standard Test Method for Mass Per Unit Area of Pile Yarn Floorcoverings
5. The primary backing should consist of a two-part polyethylene primary backing. The secondary backing should consist of an application of a minimum of 18 ounces of coating per square yard heat-activated to permanently lock fiber tufts in place. The total backing weight should not be less than 27.1 ounces. The synthetic grass system shall be perforated at a minimum of 3 inches by 4 inches on center to provide for excellent drainage. Non-perforated systems will not be acceptable alternates for purposes of this specification. The turf must have a minimum drainage rate of 250 inches per hour. These material specifications will be confirmed by independent lab testing:
 - a. ASTM F1551: Standard Test Methods for Comprehensive Characterization of Synthetic Turf Playing Surfaces and Materials
6. The carpet rolls must be of sufficient length to go from side to side of the play area. Full head seams will not be acceptable unless as required to cut around equipment posts.
7. The shock attenuation pad must be a 100% recycled, postindustrial cross linked, closed cell polyethylene-polyolefin foam material. The pad should allow for vertical and horizontal drainage. The pad should come with a 25-year manufacturer's warranty.
8. The alternate shock attenuation layer of unitary rubber buffing's should be either EPDM, SBR or a combination mixed with aromatic or aliphatic urethane binder.
9. The non-rubber infill must be an acrylic polymer coated sand, commonly known as T°Cool. No other infills will be accepted without prior written approval by the Architect/Owner.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The turf installer must strictly adhere to the installation procedures outlined under these sections. Any variance from these requirements must be accepted in writing by the manufacturer's representative, and submitted to the Architect/Owner, verifying that the changes do not in any way affect the warranty.
- B. The turf installer should inspect the stone base substrate prior to the installation of the synthetic turf system to determine if it is acceptable.
- C. Extreme care should be taken to avoid disturbing the substrate in regard to planarity.
- D. Playground pad shall be laid out and cut around the playground equipment so as not to leave gaps greater than 1/4 inch between the post and the pad. Alternate poured rubber base layer should be poured to touch the equipment poles with no gaps between the posts and the rubber.
- E. The full width rolls of synthetic grass shall be laid out across the area, utilizing standard state-of-the-art gluing procedures each roll shall be seamed to the next.
- F. This is a 100% glued installation. Sewing of seams will not be permitted. The seaming tape and glue shall be intended for installation of outdoor synthetic turf surfaces. The adhesive must be a polyurethane-based adhesive, latex-based adhesives are not acceptable.
- G. The synthetic turf will be fastened to perimeter nail boards with triple coated 1-inch construction lag screws every 4 to 5 inches around the perimeter.
- H. The play area will be infilled with 2 pounds per square foot of rounded T°Cool infill (or alternative infill as specified by the Architect/Owner) and brushed with a motorized rotary nylon broom to stand up the fibers and allow the infill to settle to the bottom of the turf upon completion of the installation.

PART 4 MAINTENANCE AND WARRANTY

4.01 WARRANTY

- A. The bidder and/or the turf manufacturer must provide the following:
 - 1. The turf manufacturer shall provide a warranty to the Owner that covers defects in materials and workmanship of the turf for a period of at least 10 years from the date of Substantial Completion. A 10-year "UV stabilization" warranty shall be included in the warranty.
 - 2. The manufacturer's warranty must include damage caused from UV degradation. The warranty will specifically exclude vandalism, acts of War and acts of God beyond the control of the owner, installer, general contractor, or the manufacturer.
 - 3. The bidder should provide a warranty to the Owner that covers defects in the installation workmanship for a period of at least 2 years, and further warrant the installation was done in accordance with the manufacturer's recommendations.
 - 4. All turf warranties must be limited to repair or replacement of the affected areas and must include all necessary materials, labor, transportation costs, and other associated costs to complete said repairs. All warranties are contingent on the full payment by the Owner of all pertinent invoices.
 - 5. The turf installer and/or manufacturer's representative will provide on-site maintenance training upon substantial completion of the project. Optional maintenance equipment will be demonstrated and discussed at that time.
- B. Addendum A – Common Aggregate Base Profiles
 - 1. Specifier Note: These generic base profiles do not consider the site-specific characteristics that the specifier must consider. Drainage issues, subgrade condition, and environmental factors will all impact the decision as to which base profile will work best in any specific site. In all cases, we recommend aggregate be compacted in lifts every 2 inches (as opposed to the more common 4 inches) so to minimize settling problems in the future.
- C. New Construction:
 - 1. In most cases a 3- to 4-inch base of CA6 compacted in 2-inch lifts will be sufficient for good drainage and providing a good foundation for the shock attenuation layer. If the shock attenuation layer is going to be recycled foam padding, the base layer should be compacted to a 90 proctor and laser graded for planarity. If the shock attenuation layer is going to be poured rubber buffing, the base layer should be compacted to a 90 proctor, but it is not necessary to have the base laser graded, just level to the eye is sufficient.
- D. Resurfacing:
 - 1. Existing Poured Rubber to be Reused:
 - a. In cases where an existing poured rubber surface can be repaired and reused as a shock attenuation layer, savings of 25% to 40% can be achieved for the Owner. The process is to repair as needed, test for fall height, then cover with synthetic turf and retest for fall height.
- E. Conversion from Wood Fiber:
 - 1. When the playground surface is being converted from wood fiber to synthetic turf, there is usually between 12 to 24 inches of base layer to fill. In these cases, layers of CA5 on the bottom, then CA7, then CA6 or CA16 (3/8-inch chips) can be used to fill the excavated area to the proper level.
 - 2. An alternative of Vulcan 210 can be used to fill the area with a 1-inch layer of CA6 or CA16 at the top for planarity.

END OF SECTION

**SECTION 323113
CHAIN LINK FENCES AND GATES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Posts, rails, and frames.
- B. Wire fabric.
- C. Manual gates with related hardware.
- D. Accessories.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- C. ASTM A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- E. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.
- F. CLFMI CLF-SFR0111 - Security Fencing Recommendations.
- G. FS RR-F-191/1D - Fencing, Wire and Post Metal (Chain-Link Fence Fabric).

1.03 SUBMITTALS

- A. Product Data: Provide data on fabric, posts, accessories, fittings and hardware.
- B. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.

1.04 SUSTAINABLE DESIGN SUBMITTALS

- A. The owner is seeking a Parksmart Certification (the LEED Certification for Parking Garages) for this building, including work related to this specification section. The goals provided below are requirements and necessary to include in the bids for the entire duration of the project. See the project Parksmart Requirements Section 01 81 13 for additional information and requirements. Tracked information to be provided to General Contractor / Construction Manager for the project to be assembled and presented to the owner and design team monthly.
 - 1. Project Goals
 - a. 85% or more of construction waste be recycled or reused, tracked by both weight and volume.
 - b. At least 75% of construction materials be sourced regionally. Provide records on all building materials and distinguish those products that have been extracted, harvested, recovered, and or manufacture within 300 miles of the project site, tracked by both volume and cost.
 - c. At least 60% of labor be regional, tracking the hours worked by personnel that live within 70 miles of the project site and the total hours worked by personnel, including those that live farther than 70 miles from the project site. This will contractor require tracking the home location (city, town or village, not home address) for construction personnel on site.
- B. Section 01 81 13 – Parksmart Requirements: for sustainable design submittals.
- C. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 - 1. Material Resources Certificates:

- a. Certify recycled material content for recycled content products.
- b. Certify source for regional materials and distance from Project site.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Line Posts: 1.9 inch diameter.
- B. Corner and Terminal Posts: 2.38 inch diameter.
- C. Gate Posts: 3-1/2 inch diameter.
- D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.
- E. Bottom Rail: 1.66 inch diameter, plain end, sleeve coupled.
- F. Gate Frame: 1.66 inch diameter for welded fabrication.
- G. Fabric with Pre-Inserted Slats: 2 inch diamond mesh interwoven wire, 6 gauge, 0.1920 inch thick, top selvage knuckle end closed, bottom selvage twisted tight.
 - 1. Privacy Slats: High-density polyethylene (HDPE), woven into fabric.
 - a. Visual Barrier: 95 percent.
 - b. Slat Color: As selected.
- H. Tension Wire: 6 gauge, 0.1920 inch thick steel, single strand.
- I. Tie Wire: Aluminum alloy steel wire.

2.02 MATERIALS

- A. Posts, Rails, and Frames:
 - 1. Formed from hot-dipped galvanized steel sheet, ASTM A653/A653M, HSLAS, Grade 50, with G90 (Z275) zinc coating.
 - 2. Line Posts: Type I round in accordance with FS RR-F-191/1D.
 - 3. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round in accordance with FS RR-F-191/1D.
- B. Wire Fabric:
 - 1. ASTM A392 zinc coated steel chain link fabric.

2.03 MANUAL GATES AND RELATED HARDWARE

- A. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp; keepers to hold gate in fully open position.
- B. Hinges: Finished to match fence components.
 - 1. Brackets: Round.
 - 2. Mounting: Center.
 - 3. Closing: Manual.
- C. Latches: Finished to match fence components.
 - 1. Brackets: Round.
 - 2. Locking: Mechanical.

2.04 ACCESSORIES

- A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.
- B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.
- C. Privacy Slats: High-density polyethylene (HDPE) strips, sized to fit fabric weave.

2.05 FINISHES

- A. Components (Other than Fabric): Galvanized in accordance with ASTM A123/A123M, at 1.7 ounces per square foot.
- B. Components and Fabric: Vinyl coated over coating of 1.8 ounces per square foot galvanizing.

- C. Hardware: Hot-dip galvanized to weight required by ASTM A153/A153M.
- D. Accessories: Same finish as framing.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install framework, fabric, accessories and gates in accordance with ASTM F567.
- B. Place fabric on outside of posts and rails.
- C. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.
- D. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.
- E. Do not attach the hinged side of gate to building wall; provide gate posts.

3.02 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch.
- B. Maximum Offset From True Position: 1 inch.

END OF SECTION

SECTION 32 91 19
TOPSOIL-SELECT FILL MATERIALS AND APPLICATION

PART 1 GENERAL

1.01 SCOPE

- A. The work under this section shall consist of providing all topsoil, labor, material and equipment required to complete the work described herein in strict accordance with the Drawings and/or terms of the contract.
- B. All work on the public lands and/or public rights of way shall conform to the applicable City of Madison's Standard Construction Specifications stated below.
- C. All work shall be in accordance with applicable manufacturer's instructions.

1.02 RELATED WORK AND PROVISIONS

- A. Applicable provisions of Division 1 shall govern all work:
 - 1. Section 02 20 00 – General Sitework Requirements
 - 2. Section 31 20 00 – Earthmoving
 - 3. Section 31 25 00 – Erosion Control
 - 4. Section 32 92 19 – Seeding and Sodding

1.03 REFERENCES

- A. Where reference is made to the "Construction Specifications", it shall be construed to mean the pertinent section of the City of Madison's Standard Construction Specifications, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- B. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the WisDOT Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the "Geotechnical Report", it shall be construed to mean the geotechnical report in Section 02 32 00.

1.04 QUALITY ASSURANCE

- A. Pre-Work Meeting: Convene a pre-work meeting minimum 30 days prior to commencing work on this Section. Review conditions of operations, procedures and coordination with related work. The pre-work meeting shall be set up as a conference call with the Landscape Architect.
 - 1. Review planting schedule and maintenance.
 - 2. Review required inspections, schedule of topsoil testing, and environmental procedures.
- B. Soil-Testing Laboratory Qualifications:
 - 1. Multi-residue Herbicide/Pesticide Screen: A NELAC (National Environmental Laboratory Accreditation Conference) certified independent soil testing laboratory with the experience and capability to conduct the testing indicated based on local conditions.
 - 2. Topsoil Analysis: Independent soil testing laboratory employing a landscape or soil agronomist familiar with the final use of the material and construction practices for large earthwork sites.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Select fill shall be a loamy sand, sandy loam, clay loam, loam, silt loam, sandy clay loam or other soil approved by the Owner's Construction Representative. It shall not have a mixture of subsoil and shall contain no slag, cinders, stones, lumps of soil, sticks, roots, trash or other extraneous materials larger than 1.5 inches in diameter. Select fill must also be free of viable plants or plant parts of common Bermuda grass, quack grass, Johnson grass, nutsedge, poison ivy, Canada thistle, or others as may be specified. All select fill shall be tested by a reputable laboratory for pH and soluble salts. If needed, pH correction material shall be applied at a rate sufficient to correct the pH to a range of 6.0 to 7.0. Soluble salts shall not be higher than 500 parts per million.
- B. No turfgrass sod shall be placed on soil which has been chemically treated until sufficient time has elapsed to permit dissipation of all toxic materials. The general contractor shall assume full responsibility for any loss or damage to turfgrass sod arising from improper use of chemicals or due to his failure to allow sufficient time to permit dissipation of toxic residues, whether or not such materials are specified herein.
- C. Topsoil on the existing site may often be used; however, it should meet the same standards as set forth in these specifications.
- D. Refer to Drawings for specifications on Engineered Soils and Sand Storage Layers, as specified by Wisconsin Department of Natural Resources (WDNR).

PART 3 EXECUTION

3.01 GRADING

- A. The select fill shall be uniformly distributed on the designated area(s) and it shall be a minimum of 6 inches deep after firming.
- B. No grading shall be done beyond the limits specified within the Grading and Erosion Control Plan.
- C. Spreading shall be performed in such a manner that sod installation can proceed with a minimum of additional soil preparation and tillage.
- D. Any irregularities in the surface resulting from top-soiling or other operations shall be corrected in order to prevent the formation of depressions or water pockets.
- E. Select fill shall not be placed while in a frozen or muddy condition, when the subgrade is excessively wet, or in a condition that may otherwise be detrimental to proper grading or proposed for seeding.

3.02 CLEAN UP

- A. After the select fill has been spread and the final grade approved, it shall be cleared of all grade stakes, surface trash or other objects that would hinder seeding and other plantings.
- B. Paved areas over which hauling operations are conducted shall be kept clean and any soil which may be brought upon the surfacing shall be promptly removed.
- C. The wheels of all vehicles shall be kept clean to avoid tracking soil on the surfacing of roads, walks or other paved areas.

3.03 ACCEPTANCE

- A. Acceptance will be given by the Owner's Construction Representative, upon satisfactory completion of each section or area(s), as indicated on the Drawings or as otherwise specified.

END OF SECTION

**SECTION 32 92 00
TREES, SHRUBS, AND OTHER PLANTINGS**

PART 1 GENERAL

1.01 SCOPE

- A. These specifications, along with the Contract Drawings, and lists of plant materials, apply to those items necessary for and incidental to the preparation, execution, completion and maintenance of the landscape planting activities (excluding lawn areas) specified in the contract. The scope includes the planting of trees, shrubs, perennials, and grasses, and the maintenance activities of fertilizing, pruning and watering.

1.02 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section.
- B. Section 02 20 00 – General Sitework Requirements
- C. Section 31 10 00 – Site Clearing
- D. Section 31 20 00 – Earthmoving
- E. Section 31 25 00 – Erosion Control
- F. Section 32 91 19 – Topsoil-Select Fill Materials and Application
- G. Section 32 92 19 – Seeding and Sodding

1.03 REFERENCE STANDARDS

- A. American Standards for Nursery Stock, ANSI Z60.1, current edition. American Association of Nurserymen, Inc.
- B. Standardized Plant Names, Second Edition (1942). American Joint Committee on Horticulture Nomenclature, Horace McFarland Company, Harrisburg, PA.
- C. American National Standard for Tree Care Operations - Tree, Shrub and Other Woody Plant Maintenance-Standard Practices, ANSI A300, current edition.
- D. Where reference is made to the "Geotechnical Report", it shall be construed to mean the geotechnical report in Section 02 32 00.

1.04 QUALITY ASSURANCE

- A. All plant material shall conform to the American Standards for Nursery Stock, unless noted otherwise herein.
- B. All plant material shall be true to the species and variety/hybrid/cultivar specified, and nursery-grown in accordance with good horticultural practices, and under climatic conditions similar to those of the site location. Specimens' nursery-dug to be replanted shall have been freshly dug and properly prepared for planting.
- C. Trees and Shrubs:
 - 1. Shall be trained in development and appearance as to be superior in form, compactness and symmetry. Trees with multiple leaders, unless specified otherwise, and shrubs with damaged or cut mainstem(s), will be rejected.
 - 2. With a damaged, cut or crooked leader, abrasion of bark, sunscald, frost crack, disfiguring knots, insects (including eggs and larvae) or insect damage, cankers/cankorous lesions or fungal mats, mold, prematurely-opened buds, or cuts of limbs over 3/4 inches (1.9 cm) in diameter that are not completely callused will be rejected.
 - 3. Shall have healthy, well-developed root systems, and be free from physical damage or other hindrances to healthy growth.
 - 4. Balled and burlapped plants shall be dug with solid balls of a diameter not less than that recommended by the American Standards for Nursery Stock, and of sufficient depth to include both fibrous and feeding roots. Balls shall be securely wrapped with burlap, and tightly bound with rope or twine. No plant shall be bound with rope or wire in such manner

as to damage bark or break branches. The root flare should be within the top 2 inches (5.1 cm) of the soil ball. Balled and burlapped plants will not be accepted if the ball is dry, cracked, or broken before or during planting.

- 5. Containerized plants are to be well-established within the container, with a root system sufficiently developed to retain its shape and hold together when removed from the container. Soil within the container should be held together by the roots, in form and whole. Plants shall not be pot-bound, nor have kinked, circling, or bent roots.
- D. Herbaceous perennials and grasses shall only be supplied from nurseries certified by state plant inspectors.

1.05 MEASUREMENT

- A. Plants shall conform to the measurements specified within the contract documents. Specified height and spread dimensions will refer to the main body of the plant, and not from branch tip to branch tip. Plants meeting a specified measurement, but judged to lack the balance between height and spread characteristic of the species will be rejected.
- B. Plants shall be measured when branches are in their normal position.
- C. No plant shall be less than the minimum size specified, and no less than 50% of the plants shall be as large as the maximum size specified.
- D. Caliper measurements shall be taken 54 inches (1.4 m) above ground level
- E. Containerized shrubs shall be measured by height and width for conformity with the plant list
- F. Herbaceous perennials and grasses shall be measured by pot size, not by top growth
- G. All other measurements, such as number of canes, ball sizes, and quality designations, shall conform to American Standards for Nursery Stock.

1.06 SUBSTITUTIONS

- A. The substitution of plant materials is not permitted unless authorized, in writing, by the Owner's Representative. If written proof is submitted by the Contractor that a plant of specified species, variety or size is unavailable, consideration will be given towards the nearest available size or variety, or towards an alternate species selection, with a corresponding adjustment of the contract price.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. The Contractor is to arrange for the acceptance and unloading of plants at the project site.
- B. All plants are to be labeled by plant name and size. Labels shall be attached securely to all plants, bundles, and containers of plant materials when delivered. Labels shall be durable and legible, with information given in weather-resistant ink or embossed process lettering. The Owner should verify all plant labels, upon approval the plant labels shall be removed by the Contractor.
- C. All plant materials, shipments and deliveries shall comply with current state and federal laws and regulations governing the inspection, shipping, selling and handling of plant stock. If required by law or regulation, a certificate of inspection, or a copy thereof, for injurious insects, plant diseases, and other plant pests shall accompany each shipment or delivery of plant material. The certificate shall bear the name(s) and address(es) of the source of the plant stock.
- D. During transport, no plant shall be bound with rope or wire in a manner that damages trunks or breaks branches. Plants shall also not be dragged, lifted or pulled by the trunk, branches or foliage in a damaging way. No plant shall be thrown off of a truck or loader to the ground.
- E. Prior to installation, all plants must be protected from sun and drying winds.
- F. Containerized or balled and burlapped plants not being installed immediately must be kept in a shaded area, well-covered with wood chips, soil, or other approved material, and kept well-watered. Install all plants within three (3) days of delivery.

- G. Fertilizer shall be delivered to the site in original, sealed containers, and stored in a waterproof space. Containers shall bear the manufacturer's name, analysis, trademark and guarantee as per standards of the Wisconsin Department of Agriculture.
- H. Contractor shall protect all plants, lawns, and grass from damage at all times. Damaged plants, lawns or grass areas shall be replaced or treated as required to conform to specifications herein for fresh stock. Damage incurred as a result of replacement or installation operations shall be repaired by Contractor at no cost to Owner.

1.08 PLANTING SCHEDULE

- A. Plants shall be installed as appropriate for that specific plant species to ensure healthy vigorous growth.
- B. All plants shall be guaranteed to be in healthy and flourishing condition for one full year after installation and acceptance by the Owner.
- C. Plants not thriving shall be replaced at no cost to the Owner. The contractor may suggest substitutions for replacement plants.
- D. Replacement plants shall be guaranteed for one year after installation.
- E. At any time during the guarantee period, the Contractor shall remove or replace, without cost to the Owner and within a specified planting period, all plants not in a healthy and flourish conditions as determined by the Owner.

1.09 MAINTENANCE

- A. The Contractor shall maintain plantings and lawn for at least a period of 60 days, or until final acceptance from the Owner. The Contractor is responsible for adequately watering plants and lawn during this 60 day period.
- B. Fertilizing: Any and all chemical applications are to be performed in accordance with current federal, state and local laws, through EPA-registered materials and application techniques, and performed under the supervision of a licensed certified applicator. Apply fertilizer to planted areas at the specified rate, and as per manufacturer's recommendations.
- C. Watering: All plant materials installed under the contract shall be watered within the first 24 hours of initial planting and not less than twice weekly until final acceptance by the Owner. Water used shall be of sufficient quality for irrigation and free of materials harmful to plant growth.
- D. Pesticide: Any use of pesticides during the contracted maintenance period, as determined by the Owner, shall utilize the minimum amount of approved pesticide needed to control pests on plant materials installed under the contract. Pesticide applications are to be performed in accordance with current federal, state and local laws, through EPA-registered materials and application techniques, and performed under the supervision of a licensed certified applicator. Apply at the specified rate, and as per manufacturer's recommendations.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Plant Materials: A complete list of plant materials, including a schedule of quantities, sizes, and other requirements, shall be included in the contract documents. If discrepancies occur between the printed plant list, and the Contract Drawings, the printed list will take precedent.
- B. Topsoil: Naturally fertile, agricultural soil, capable of sustaining vigorous growth, of uniform composition throughout, without admixtures of subsoil, free of clay, stones larger than 1 inch (2.5 cm) in diameter, roots, trash and debris of any kind, supplied by Contractor at his/her expense, and subject to approval by the Owner's Construction Representative.
- C. Planting Mixture: Material used in tamping around balls and roots during the planting operation shall be prepared on site by mixing two (2) parts topsoil, one (1) part sand and one (1) part compost. All mixing shall be done by mechanical means subject to the approval of the Owner's Construction Representative.

- D. Fertilizer: Granular, non-burning product composed of not less than 50% organic slow-acting, guaranteed analysis professional fertilizer. Commercial fertilizer shall conform to Wisconsin State Statutes, Section 94.64, and meet the standards of the Wisconsin Department of Agriculture as to registration and labeling. Fertilizer shall be specified in the contract documents as to composition, but is subject to revision to suit project site conditions.
- E. Shredded Hardwood Bark Mulch: Shredded hardwood bark mulch, free of material detrimental to healthy plant growth. Mulch shall be finely shredded, weed free, dye-free mulch
- F. Stone Mulch: Planted stone mulch areas shall follow the plan specifications and be spread to a minimum and consistent depth of 3-inches. Stone mulch areas shall receive woven weed barrier fabric.

PART 3 EXECUTION

3.01 INSPECTION

- A. Topsoil: Refer to Topsoil-Select Fill Materials and Application Section specifications.
- B. Verify that prepared soil base is ready to receive the work of this Section.
- C. Beginning of installation means acceptance of existing site conditions.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove any contaminated subsoil. Plants can be removed through application of glyphosphate. Follow manufacturer's instructions for proper use.
- C. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.

3.03 PLACING TOPSOIL

- A. Refer to Topsoil-Select Fill Materials and Application Section specifications.
- B. Spread any needed amendments per soil test and till soil to a depth of 3 to 4 inches. Ideal seed bed will be a combination of soil particles ranging from approximately a quarter inch to a full inch in size.
- C. Topsoil compaction should be below 250 psi, if topsoil compactions are greater soil should be ripped, disced, or otherwise loosened to a depth of at least 12 inches.

3.04 PREPARATION

- A. Stake all planting areas and notify Digger's Hotline (1-800-242-8511 statewide) to verify location of all underground utilities prior to excavation.
- B. Excavate planting areas as shown in included specifications.
- C. Adequately barricade with proper warning devices any planting pit left open when planting work is not in progress, and that poses a hazard to vehicles and/or pedestrians.
- D. Maintain site housekeeping to provide for a safe and orderly project site. Collect and dispose of debris as they accumulate.
- E. The planting pit for containerized and balled and burlapped plants shall be at least 2.5 to 3 times the diameter of the soil ball, or to a dimension otherwise specified.
- F. The planting pit for a single shrub shall be 12 inches (30.5 cm) wider than the root ball.
- G. Loosen the soil beyond the edge of the planting pit. The soil at the base of the planting pit is to remain undisturbed, the depth of which shall correspond to the distance from the bottom of the soil ball to the root flare, or slightly less.
- H. Fence and/or box in all trees and plant material which are to remain at the drip line before work is started. Do not permit heavy equipment or stockpiles within branch spread. Remove interfering branches without injury to trunks, cover scars with tree paint.

- I. For a shrub mass planting, the entire bed area is to be tilled to a depth of 4 to 6 inches (10.2 to 15.2 cm). Excavate individual shrub pits to the proper depth.

3.05 PLANTING OF TREES AND SHRUBS

- A. Remove plant containers by cutting or carefully inverting the container. For plants grown in plastic containers slash the edges of the root ball from top to bottom with vertical 1-inch (2.5 cm) cuts using a sharp blade.
- B. Root balled plants shall have rope, string, wire baskets, burlap and other wrapping material removed from the top half of the ball after the plant has been set in the hole. Remaining wrappings, other than those made from plastic or synthetic material, may be left around the bottom half of the ball.
- C. Shrubs grown using root containment material shall have the containment bag removed prior to setting.
- D. Set trees and shrubs straight and upright, and in the center of the planting hole and on the unexcavated base of the planting pit, with the most desirable face towards the most prominent view.
- E. Root-balled shrubs are to be carried and set in the hole by the root ball.
- F. Backfilling: Backfill pits with excavated soil. No soil in frozen or muddy condition shall be used for backfilling.
- G. When pit is approximately two-thirds backfilled, tamp down and water to eliminate air pockets. After initial watering, add remainder of the soil to the top of pit, water without puddling, and firmly tamp without over compacting. Form a 2- to 3-inch (5.1 to 7.6 cm) high saucer around the outer rim of the pit prior to mulching.
- H. All trees shall be installed with 5-foot diameter tree ring with 3-inch mulch layer. Tree rings shall have shovel edging.
- I. All parking islands shall receive a minimum of 24 inches of topsoil.

3.06 PLANTING OF PERENNIALS, FORBS, AND GRASSES

- A. Preparation: Loosen soil of the planting bed to a depth of 4 to 6 inches (10.2 to 15.2 cm) by mechanical or hand tilling while soil is dry. For bulbs, the depth of loosened soil will be determined by the type of bulb planted, and specified in the contract or landscape plan.
- B. After soil is loosened, till organic material into the soil across the planting bed to a uniform depth of 2 inches (5.1 cm) for peat moss or 1 inch (2.5 cm) for compost.
- C. Fertilizer, at amounts determined by the soil test, shall be topdressed to the soil.
- D. Apply approved mulch uniformly across the entire planting bed to a depth of 1 to 2 inches (2.5 to 5.1 cm).
- E. Planting: Space as described in the landscape plan.
- F. Unless otherwise specified, install plants no closer than 12 inches (30.5 cm) to the trunks of trees or shrubs within planting bed, and to within 6 inches (15.2 cm) of the edge of the bed.
- G. Prior to planting, biodegradable plant containers shall be split and non-biodegradable containers removed. The root systems of all such plants shall be split or crumbled by hand.
- H. All parking islands shall receive a minimum of 24 inches of topsoil.

3.07 FINISHING

- A. Finish-grade planting areas to required elevations after plants have fully settled.
- B. No soil is to cover the top of the root ball. All plants shall be completely mulched over the root system with a 3-inch (7.6 cm) layer of specified mulching material immediately after planting. Pull back mulch no less than 3 inches (7.6 cm) and no more than 6 inches (15.2 cm) from the trunk.

- C. Thoroughly water plants immediately after planting and before mulching, primarily within and filling the saucer.
- D. Prune any dead or broken branches. Prune in accordance with NAA Guidelines conforming to the American Standard for Tree Care Operations. Prune shrubs in accordance with standard horticultural practices. On cuts of 3/4 inches in diameter and bruises or scars on bark, trace the injured cambium layer back to living tissues and remove. Smooth and shape wounds so as not to retain water and coat the treated area within approved antiseptic tree paint.
- E. Remove all twine and rope after planting, along with any labels attached around trunks or branches.

3.08 CLEANING

- A. Dispose of excess soil. Remove all cuttings and waste materials.
- B. Soil, branches, binding and wrapping material, rejected plants, or other debris resulting from plant installation shall be promptly cleaned up and removed. New landscape construction in and around the planting areas are to be especially well-cleaned.
- C. Under no condition shall the accumulation of soil, branches or other debris be allowed upon a public property in such a manner as to result in a public hazard. Likewise, under no circumstances shall any debris or incidental materials be allowed upon adjacent private property.

END OF SECTION

**SECTION 32 92 19
SEEDING AND SODDING**

PART 1 GENERAL

1.02 SUMMARY

- A. The work under this section includes:
 - 1. Preparation of subsoil
 - 2. Placing topsoil
 - 3. Fertilizing
 - 4. Seeding
 - 5. Seed Protection
 - 6. Mulching

1.02 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this Section.
- B. Related sections:
 - 1. Section 02 20 00 – General Site Work Requirements
 - 2. Section 31 10 00 – Site Clearing
 - 3. Section 31 13 16 – Tree Protection
 - 4. Section 31 20 00 – Earthmoving
 - 5. Section 31 25 00 – Erosion Control
 - 6. Section 32 91 19 – Topsoil-Select Fill Materials and Application

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Seed shall be delivered to the site in its original, unopened container, labeled as to weight, analysis, and manufacturer. Seed in damaged packaging is not acceptable. Store any seed delivered prior to use in a manner safe from damage from heat or any other deleterious weather conditions.
- B. Planting Season: The regular seeding season is considered April 1st through June 15th and September 1st through October 15th. If planting outside of regular seeding season, the Contractor is responsible for adequately watering the site to obtain vigorous healthy plant growth.

1.04 REFERENCE SPECIFICATIONS

- A. Where reference is made to the "Construction Specifications", it shall be construed to mean the pertinent section of the City of Madison's Standard Construction Specifications, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- B. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the WisDOT Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the "Geotechnical Report", it shall be construed to mean the geotechnical report in Section 02 32 00.

1.05 GUARANTEE

- A. Guarantee plant material for a period of 12 months following the Substantial Completion Date:
 - 1. A limit of one replacement of each plant shall be required, except for losses or replacements due to failure to comply with requirements.

2. Remove from site any plant that is dead or unsatisfactory to the Owner, or Landscape Architect. Replace plants during normal planting season.

1.06 SUBMITTALS

- A. Submittals shall be available at all times to the Owner.
- B. Grower/Nursery Information: Submit name, address, phone number and contact person for each Grower/Nursery 30 days prior to plant material selection meeting.
- C. Materials Test Reports: Submit topsoil borrow area test reports to the Owner a minimum six (6) weeks prior to delivery to site.
 1. Provide location of topsoil area tested.
 2. Provide name of independent soil testing laboratory.
 3. Provide date of sampling and testing.
- D. Product Data:
 1. Submit certification tags from sod and seed verifying type and purity to the Owner.
- E. Closeout Submittals:
 1. Submit Meetings and Inspections Log prior to Final Completion of the Project.
 2. Certification of Conformance: Provide certificate of satisfactory performance of planting operations signed by the Contractor and Landscape Architect.

1.07 MAINTENANCE

- A. The Contractor shall maintain lawn for at least a period of 60 days, or until final acceptance from the Owner. The Contractor is responsible for adequately watering lawn during this 60-day period. Contractor is responsible for establishing healthy vigorous lawn growth. Long-term maintenance is the responsibility of the Owner.

PART 2 PRODUCTS

2.01 SEED MIXTURE

- A. Grass Seed: All grass seed shall conform to the requirements of Wisconsin State Statutes, Chapter 94 (Seed Law), and the Wisconsin Administrative Code Chapter ATCP 20, regarding noxious weed seed content and labeling. Seed shall not be used later than one year following the test date labeled.
- B. Public Seed Mixture: Use State Specifications Mix 40 in the right-of-way.
- C. Grounds Seed Mixture:
 1. Use seed mixtures as specified on the Drawings.
- D. Detention Basin Seeding:
 1. See Drawings for plug plantings or native vegetative mat requirements.

2.02 SOIL MATERIALS

- A. Topsoil: Refer to Section 32 91 19 - Topsoil-Select Fill Materials and Application.

2.03 SOD

- A. Provide sod species suitable as lawn turf for the region. Sod shall be strongly rooted, weed, disease, pest free, and uniform in thickness.

2.04 ACCESSORIES

- A. Mulching Material:
 1. Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable
 2. Where necessary to maintain erosion control, seed shall be applied using Method B, Hydroseeding from the State Specifications.
- B. Fertilizer: Standard commercial packaged or bulk product in granular form conforming to the requirements of Dane County and the Wisconsin Statutes and of the Wisconsin Administrative

Code Chapter Agriculture 17. Provide fertilizer meeting the following requirements: I don't know about the following, so I am going to delete it.

- C. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that prepared soil base is ready to receive the work of this Section.
- B. Beginning of installation means acceptance of existing site conditions.

3.02 PREPARATION OF SUBSOIL

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. No seeding shall occur on frozen ground or at temperatures lower than 32oF (0oC).
- C. Remove foreign materials, weeds, and undesirable plants and their roots. Remove any contaminated subsoil. Plants can be removed through application of glyphosate. Follow manufacturer's instructions for proper use.
- D. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted subsoil.
- E. Unsuitable Subsoils: Locations containing unsuitable subsoil shall be treated by one or more of the following:
 - 1. Where unsuitability is deemed by the Owner to be due to excessive compaction caused by heavy equipment and where natural subsoil is other than AASHTO classification of A6 or A7, loosen such areas with spikes, discing, or other means to loosen soil to condition acceptable to the Owner. Loosen soil to minimum depth of 12 inches with additional loosening as required to obtain adequate drainage. Contractor may introduce peat moss, sand, or organic matter into the subsoil to obtain adequate drainage. Such remedial measures shall be considered as incidental, without additional cost to the Owner.
 - 2. Where unsuitability is deemed by the Owner to be due to presence of boards, mortar, concrete, or other construction materials in sub grade and where natural subsoil is other than AASHTO classification of A6 or A7, remove debris and objectionable material. Such remedial measures shall be considered as incidental, without additional cost to the Owner.
 - 3. Where unsuitability is deemed by the Owner to be because natural subsoil falls into AASHTO classification of A6 or A7 and contains moisture in excess of 30 percent, then installation of sub drainage system or other means described elsewhere in Specifications shall be used. Where such conditions have not been known or revealed prior to planting time and they have not been recognized in preparation of the Drawings and Specifications, then the Owner shall issue pricing order to install proper remedial measures.

3.03 PLACING TOPSOIL

- A. Refer to Section 32 91 19 - Topsoil-Select Fill Materials and Application.
- B. Spread any needed amendments per soil test and till soil to a depth of 3 to 4 inches. Ideal seed bed will be a combination of soil particles ranging from approximately a quarter inch to a full inch in size.

3.04 FERTILIZING

- A. Apply seed starter fertilizer at the rate specified by the product manufacturer.
- B. Fertilizer must be phosphorus free and meet Dane County requirements.
- C. Apply after smooth raking of topsoil.
- D. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- E. Mix thoroughly into upper 2 inches of topsoil.

- F. Lightly water to aid the dissipation of fertilizer

3.05 SEEDING

- A. Firm up soil with light irrigation—lightly dampen soil before seeding.
- B. Sow seed using either Method A or Method B as defined in Section 630.3.3 of Standard Specifications for Highway Construction.
- C. Protect seeded slopes of 4:1 or greater against erosion with erosion control materials specified on grading and erosion control plan.
- D. Apply seed evenly in two directions at a rate specified by the product manufacturer. Rake in lightly. A cultipacker or similar equipment shall be used to enhance soil/seed contact. Care shall be taken to avoid damage to erosion mat in areas where erosion mat is specified. Do not seed areas in excess of that which can be mulched on the same day.
- E. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- F. Do not broadcast or drop seed when wind velocity exceeds 5 mph.
- G. Do not use seed that is wet, moldy, or otherwise damaged in transit or storage.
- H. Sow seed at a rate of 1½ pounds per 1,000 square feet. In addition to lawn seed, annual rye shall be applied to all disturbed areas at a rate of 1½ pounds per 1,000 square feet.
- I. Roll seeded area with 24-inch width roller not exceeding 112 pounds.
- J. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches.
- K. Apply water with a fine spray immediately after each area has been mulched keeping the top 1 to 2 inches of soil moist but not soaking. Water adequately to achieve a healthy stand of weed free lawn. Do not let soil dry out.
- L. Apply a second application of seed starter fertilizer at the rate specified by the product manufacturer 3 weeks after seeding.
- M. Begin weekly mowing when first seedlings reach 2 inches. Do not mow right after watering. Raise mowing height to 3 inches after six (6) weeks. Never remove more than 1/3 of the grass blade at a time.
- N. Begin standard fertilization and irrigation programs after eight (8) weeks. Do not apply any weed control products until lawn has been mowed at least four (4) times and a minimum of eight (8) weeks have passed. Follow manufacturer's recommendations for new lawns.

3.06 SEED PROTECTION

- A. Identify seeded areas with stakes around area periphery. Refer to Drawings for signage.

3.07 SODDING

- A. Cut and lay sod on same day. Only healthy vigorous growing sod shall be laid.
- B. Lay sod across slope and tightly together to result in solid coverage free of gaps.
- C. Roll or firmly but lightly tamp new sod with suitable wooden or metal tamper sufficiently to set or press sod into underlying soil.
- D. All finished sodding shall be smooth and free of lumps and depressions.
- E. After sodding has been completed, clean up and thoroughly water newly-sodded areas.

3.08 MAINTENANCE DURING CONSTRUCTION

- A. Begin maintenance operations immediately after each plant is planted and continue as required until acceptance. Water, mulch, weed, prune, spray, fertilize, cultivate, and otherwise maintain and protect plants. Reset settled plants to proper grade and position, restore planting saucers, and remove dead, diseased, or unhealthy plant material. Tighten and repair stakes and wires. Correct defective work as soon as possible after it becomes apparent and weather and season permit.

- B. Upon completion of the planting operations, clean up landscaped areas to be free of stones, containers, trash, and other waste and debris to leave area in a neat and well-groomed appearance.
- C. Supplement rainfall as required to provide an equivalent of 1 inch of water per week until the plants have rooted and are established.
- D. Make weekly inspections to determine moisture content of soil and adjust watering schedule established by irrigation system installer to fit conditions.
- E. After grass growth has started, reseed or sod areas that fail to show uniform stand of grass in accordance with the Drawings and as specified herein. Continue reseeding and sodding such areas repeatedly until areas are covered with satisfactory growth of grass. Perform removal and replacement or topsoil conditioning if required to facilitate establishment of grass.
- F. Water in such manner and as frequently as is deemed necessary by the Owner to assure continued growth of healthy grass. Water areas of site in such a manner as to prevent erosion due to excessive quantities applied over small areas and to avoid damage to finished surface due to watering equipment.
- G. Provide water for execution and maintenance at no expense to the Owner. Furnish portable tanks, pumps, hose, pipe, connections, nozzles, and any other equipment required to transport water from available outlets and apply it to seeded areas in approved manner.
- H. Mowing:
 - 1. Initiate mowing of turf grass areas when grass has attained height of 3 inches and roots are firmly established. Maintain turf grass height at 2½ to 3 inches at subsequent cuttings depending on time of year. Remove no more than 1/3 of grass leaf at any cutting and cutting shall not occur more than ten (10) days apart.
 - 2. Mow native grass areas no more than three (3) times per year to a height of no less than 6 inches.
 - 3. Remove heavy cuttings to prevent destruction of underlying turf. If weeds or other undesirable vegetation threaten to smother planted species, such vegetation shall be mowed or, in case of rank growths, shall be uprooted, raked, and removed from area by methods approved by the Owner.
- I. Remove weeds and other undesirable vegetation by applying herbicides as recommended by the manufacturer or by uprooting. Rake and remove uprooted vegetation from area by methods approved by the Owner.
- J. Protect seeded area from pedestrian or vehicular trespassing while grass is germinating. Provide fences, signs, barriers, or other necessary temporary protective devices. Repair damage resulting from trespass, erosion, washout, settlement, or other causes.
- K. Remove fences, signs, barriers, or other temporary protective devices after final acceptance.
- L. Grassed areas damaged during process of work shall be restored or repaired to condition satisfactory to the Owner. Fill, grade, re-fertilize, replant, or mulch as required to restore to contract requirements.

END OF SECTION

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**SECTION 33 10 00
WATER SYSTEM CONSTRUCTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Installation of water service, accessories, and fittings on the site.
- B. Excavation, installation, bedding cover and backfill of water service facilities.
- C. Protecting existing utilities in and around the site of the work.
- D. Testing and sterilizing the new service.
- E. Coordination of the work to allow inspection by City/County and Owner's Construction Representative.
- F. Adjustment of valve boxes and manholes prior to pavement operations.

1.02 RELATED SECTIONS

- A. Section 31 20 00 - Earthmoving
- B. Section 31 23 16.13 - Trenching
- C. Section 31 25 00 - Erosion Control

1.03 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM) latest edition.
 - 1. B88 Seamless Copper Water Tube
 - 2. D1557 Test for Moisture-Density Relations of Soils Using 10-lb. (4.5 Kg) Rammer and 18-inch (457 mm) Drop (Modified Proctor)
 - 3. D2487 Classification of Soils for Engineering Purposes
 - 4. D2922 Tests for Density of Soil and Soil - Aggregate in Place by Nuclear Methods (Shallow Depth)
 - 5. D3017 Test for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
- B. American Water Works Association (AWWA) latest edition.
 - 1. C104 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
 - 2. C105 Polyethylene Encasement for Ductile Iron Piping for Water and other Liquids
 - 3. C116 Protective Fusion-Bonded Epoxy Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray-Iron Fittings for Water Supply Service.
 - 4. C151 Ductile Iron Pipe, Centrifugally Cast, for Water or Other Liquids
 - 5. C153 Ductile-Iron Compact Fittings for Water Service.
 - 6. C500 Gate Valves, 3 through 48 in NPS, for Water and Sewage Systems
 - 7. C504 Rubber-Seated Butterfly Valves
 - 8. C509 Resilient-Seated Gate Valves for Water Supply Service
 - 9. C550 Protective Interior Coatings for Valves and Hydrants
 - 10. C600 Installation of Ductile Iron Water Mains and Appurtenances
 - 11. C605 Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
 - 12. C651 Disinfecting Water Mains
 - 13. C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 inches through 12 inches, for Water Distribution
 - 14. M41 Manual of Water Supply Practices
- C. Where reference is made to the "Construction Specifications", it shall be construed to mean the pertinent section of the City of Madison's Standard Construction Specifications, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- D. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in

Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.

- E. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- F. Where reference is made to the "Geotechnical Report", it shall be construed to mean the geotechnical report in Section 02 32 00.

1.04 SUBMITTALS

- A. Conform to Section 01 33 23 - Submittals.
- B. Product Data: If requested by Owner, provide product data on pipe materials, pipe fittings, valves, and accessories.

1.05 QUALITY ASSURANCE

- A. The City's Utility Department will inspect the work.
 - 1. Provide coordination to assure that the City's inspectors observe all water service installation work.
- B. All costs related to retesting due to failures shall be paid for by the Contractor at no additional expense to Owner. Provide free access to site for testing activities.
- C. Furnish one (1) copy of results of the meter test and hydrostatic pressure test to the Developer and the City upon completion of water distribution backfilling operations.
- D. Project Record Documents:
 - 1. Disinfection Report: Record the following:
 - a. Type and form of disinfectant used.
 - b. Date and time disinfectant injection start and time of completion.
 - c. Test locations.
 - d. Initial and 24-hour disinfectant residuals (quantity in treated water) in ppm for each outlet tested.
 - e. Date and time of flushing start and completion.
 - f. Disinfectant residual after flushing in ppm for each outlet tested.
 - 2. Bacteriological Report: Record the following:
 - a. Date issued, project name, testing laboratory name, address, and telephone number.
 - b. Time and date of water sample collection.
 - c. Name of person collecting samples.
 - 3. Test locations.
 - 4. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.
 - 5. Coliform bacteria test results for each outlet tested.
 - 6. Certification that water conforms, or fails to conform, to bacterial standards.
 - 7. Bacteriologist's signature and authority.
- E. Accurately record actual locations of piping mains, valves, connections, and top of pipe elevations.
- F. Identify and describe unexpected variations to subsoil conditions and location of uncharted utilities.
- G. Provide copy of safe water samples to the City prior to placing the new main in service.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products in accordance with provisions of Division 1 and the manufacturer's instructions.
- B. Deliver and store valves in shipping containers with labeling in place.

1.07 RECORD DRAWINGS

- A. Accurately record location of pipe runs, connection, fittings, and valves

PART 2 PRODUCTS

2.01 MATERIALS

- A. General:

1. Pipe:

- a. Centrifugally cast, cement mortar lined ductile iron water main meeting the requirements of ANSI/AWWA C151/A21.51 and ANSI/AWWA C104/A21.4.
- b. Unless otherwise specified, ductile water main shall be Class 52 as defined by ANSI/AWWA C151/A21.51.
- c. Ductile iron water main joints shall be rubber gasket push-on joint or mechanical joint meeting the requirements of ANSI/AWWA C111/A21.11.
- d. Pipe shall be provided with conductive bonding straps to provide electrical continuity.
- e. Pipe shall be manufactured in the United States.
- f. All water mains, including all fittings, valves, and curb boxes, shall be wrapped with polyethylene. The polyethylene shall comply with the requirements of Chapter 8.21.0 of the Standards Specifications.
- g. Utilize DIP equipped with low profile flexible restrained joints such as Flex Ring or TR Flex for directionally drilled water main. Gripping push-on joint gaskets, or restrained joint gaskets are not permitted.
- h. All valves and fittings require armor tipped gaskets at mechanical joints. Lead tipped conductivity gaskets and bronze wedges are prohibited.
- i. Joint Restraint shall be Megalug glands made by Ebaa Iron Inc. Series 1100, or approved equal. Threaded rods for restraint shall be 3/4-inch 304 stainless steel threaded rods with stainless steel nuts and washers.
- j. All pipe shall be furnished with cable bond conductor or electrobond conductivity strips. Thermite welded straps are allowed provided weld points are thoroughly coated with bitumastic material.
- k. All buried ductile iron water main piping and fittings shall be polyethylene encased in accordance with AWWA C105. Polyethylene encasement shall be a minimum 8-mil thickness and installed in accordance with AWWA C105.

2. Valves and Valve Boxes Resilient Wedge Gate Valve

- a. Resilient Wedge Gate Valves: All valves 16 inches or smaller shall be resilient seat gate valves meeting the requirements of AWWA C509. Gate valves shall have ductile iron body, resilient wedge, non-rising stem and O-ring packing box, and rated for 250 psi working pressure. All water main gate valves shall have mechanical joint ends unless otherwise specified. Valves shall be American Flow Control resilient wedge gate valves or approved equal. Operators on water main valves shall be 2-inch square nut. Stainless steel bolts shall be used for connection of valve to water main pipe.
- b. Buried valves shall be epoxy coated in accordance with AWWA C550.
- c. Valve box stabilizer shall be Adaptor, Inc., or approved equal. Determination of specific model shall be as recommended by the manufacturer.
- d. Valve boxes shall be Tyler Model No. 6860DD, or equal, with No. 6 base, three (3) piece screw type bow, 5¼-inch shaft and stay-put cover marked "WATER". Valve boxes shall be manufactured in the United States of America and labeled as such. Use of foreign materials is prohibited.
- e. A minimum of 10-gauge coated copper wire or equivalent shall be used to provide continuity across valve.

3. Hydrants:

- a. All fire hydrants, private and public, shall conform to AWWA C502 with 5¼-inch main valve opening, 6-inch mechanical joint inlet, two 2½-inch National Standard hose connections, one 4½-inch National Standard pumper connection, and 1½-inch

- pentagon operating nut and caps, open left. No weather shield shall be provided on top operating nut.
 - b. Hydrant shall have bronze seat ring and seat insert, and ductile iron stand pipe, nozzle section, bottom, and cross arm.
 - c. Hydrant shall be Waterous WB-67, 7-foot bury, with breakaway flange and painted red. All areas of hydrant with paint defects shall be repainted with Waterous Touch-up Kit or approved equal. Stainless steel bolts shall be used for connection of hydrant to water main pipe.
 - d. Fire hydrant markers shall be 36-inch, orange, Slimline FH fire hydrant marker manufactured by Flexstake, Inc., Model No. SFH-3.
- B. Rigid Insulation:
- 1. Rigid, closed-cell, extruded polystyrene insulation. Insulation shall be suitable for buried installation.
 - 2. Individual boards shall have minimum dimensions of 8'x4'x2".
 - 3. Dow Styrofoam, 40 PSI minimum, or approved equal.
- C. Bedding and Cover:
- 1. Bedding and cover shall conform to the Standard Specifications and Construction Specifications for the City of Madison.
- D. Granular Backfill:
- 1. Granular Backfill material shall conform to the requirements of the Standard Specifications and the City's Specifications. Granular backfill shall be used under public and private pavement/walks and where shown in the plans unless otherwise directed by the City or Owner's Construction Representative based on geotechnical evaluation of native materials.
- E. Water Laterals, Lateral Materials, Valve Boxes:
- 1. Conform to the City's Specifications.
 - 2. Service laterals will confirm to the water main specifications herein.

PART 3 EXECUTION

3.01 GENERAL

- A. Conform to the requirements of the Standard Specifications.
- B. Where conflicts exist between the requirements of this section and the City's Specifications, the requirements of the City's Specifications shall govern.
- C. The City's staff will operate all existing valves and hydrants.
- D. The City shall be provided a minimum of two (2) working days' notice prior to any flushing needed.

3.02 EXAMINATION

- A. Verify that water main locations and features are as depicted on the drawings.

3.03 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Protect plant life and existing structures, from excavating equipment and vehicular traffic.
- C. Verify location of utilities in the vicinity of the proposed water main construction by hand excavation.
- D. Protect benchmarks and all other survey monuments from damage or displacement. If a marker needs to be removed, it shall be referenced by a Registered Surveyor and replaced, as necessary, by the same.
- E. Verify that materials to be used are acceptable and available in sufficient quantity to complete the work before closing valves to isolate water service to be replaced.

3.04 EXCAVATION AND BEDDING AND COVER

- A. Excavate pipe trench in accordance with Section 31 23 16.13 for the work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.
- B. Shore, brace, and drain excavations as necessary to maintain them safe, secure, and free of water at all times.
- C. Maintain optimum moisture content of bedding and cover material to attain required compaction density. Bedding and cover materials shall be sand, crushed stone, or crushed stone screening. Crushed stone shall be used in areas of high ground water.

3.03 INSTALLATION - PIPE

- A. Perform work in accordance with the requirements of Section 4.3.0 of the Standard Specifications.
 - 1. Where conflicts between the requirements of this section and the Standard Specification occur, the requirements of the Standard Specifications shall take precedence.
- B. Route pipe in straight line.
- C. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- D. Install access fittings to permit disinfection of water system.
- E. Encase ductile or cast iron pipe in polyethylene in accordance with the requirements of Section 4.4.4 of the Standard Specifications.
- F. Mega-lug and rodding shall be used for joint restraints at all bends and fittings. Pipe restraint shall be determined using the Restraint Length Calculator at www.ebaa.com or an approved equal to determine restraint requirements.
- G. All fittings shall be wrapped with Poly Wrap.
- H. Establish elevations of buried piping to ensure final cover of no less than 7 feet.

3.04 INSTALLATION - VALVES AND HYDRANTS

- A. Set valve box stabilizer on top of valve. Center and plumb valve box over valve. Set box cover flush with finished grade.
- B. Final adjustments on all valves are incidental to installation.
- C. Install gate valves as indicated on Construction Drawings. Support valve on concrete pads with valve stem vertical and plumb. Install valve boxes in manner that will not transmit loads, stress, or shock to valve body. Center valve box over operating nut of valve vertical and plumb. Securely fit valve box together leaving cover flush with finished surface.
- D. Install fire hydrant assemblies as indicated on Construction Drawings in vertical and plumb position with steamer/pumper nozzle pointed perpendicular to traffic where hydrant is adjacent to street, roadway, or parking lot drive or toward protected building unless otherwise directed by local authorities.
 - 1. Support hydrant assembly on concrete pad and firmly brace on side opposite inlet pipe against undisturbed soil and concrete blocking.
 - 2. Place minimum of 6 cubic feet of crushed stone or gravel around hydrant base and barrel after thrust blocking has cured at least 24 hours. Maintain vertical position of hydrant backfilling and compacting.
 - 3. Install 4 feet behind curb.
 - 4. Install auxiliary valve in pavement.
 - 5. Center pumper nozzle 18 to 23 inches to finished grade.
 - 6. Mega-Lug all auxiliary valve and hydrant joints.
 - 7. Shall be wrapped in polyethylene to within 6 inches of finished grade.

3.05 WATER SERVICE PIPE INSTALLATION

- A. Minimum 6½ feet of cover to top of pipe.
- B. Service pipe shall be seamless from the main to the curb box.

- C. Water services shall extend 5 feet into the lot or within 5 feet of the exterior building foundation.
- D. Point of termination of lot services shall be marked with a 6-foot steel fence post with 1 foot of the post below the end of the service. A 6-foot 4"x4" treated wood post will also be installed at the end of each service with 3 feet of the post being buried below grade. The exposed portion of the post shall be painted blue.
- E. Water Service Fitting shall be direct tap for 1¼-inch. Use tapping saddle for all taps over 1 inch.

3.06 DISINFECTION OF WATER SYSTEM

- A. Disinfect system in accordance with the City's Specifications.
- B. The cost for water system disinfection is incidental to the price bid for Water Service Construction.

3.07 TESTING OF WATER SYSTEM

- A. Perform hydrostatic pressure and leakage test on all pipe, fittings, services and joints in accordance with AWWA C600 and the City of Madison's Standards.
- B. The Contractor is responsible for conducting and reporting the results of all testing.

END OF SECTION

**SECTION 33 30 00
SANITARY SEWER UTILITIES**

PART 1 GENERAL

1.01 SUMMARY

- A. The work under this section shall consist of providing all work, materials, labor, equipment, and supervision necessary to provide for the sanitary sewer work required in these specifications and on the drawings. This specification shall apply to all sanitary sewer work beginning at a point 5 feet outside of the building wall, unless otherwise specified.

1.02 RELATED SECTIONS

- A. Section 31 20 00 - Earthmoving
- B. Section 31 23 16.13 - Trenching

1.03 STANDARD SPECIFICATIONS

- A. Where reference is made to the "Construction Specifications", it shall be construed to mean the pertinent section of the City of Madison's Standard Construction Specifications, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- B. Where reference is made to the "Standard Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- C. Where reference is made to the "State Specifications", it shall be construed to mean the pertinent section of the Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.

1.04 SUBMITTALS

- A. Submit documentation of materials meeting the required specifications.
- B. The Owner shall provide testing agency do all testing. The Contractor shall coordinate the tests with the Owner's testing agency.

1.05 REFERENCE

- A. Applicable provisions of Division 1 shall govern all work under this section.
- B. Reference Standards:
 - 1. American Society for Testing and Materials (ASTM):

C425-04	Standard Specification for Compression Joints for Vitrified Clay Pipe and Fittings
D1784-03	Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
D2235-04	Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
D2564-04	Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
D2680-01	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) and Poly(Vinyl Chloride) (PVC) Composite Sewer Piping
D3034-04a	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D3212-96a(2003)e1	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

- | | |
|-----------|--|
| D3350-05 | Standard Specification for Polyethylene Plastics Pipe and Fittings Materials |
| D4673-02 | Standard Classification System for Acrylonitrile-Butadiene-Styrene (ABS) Plastics and Alloys Molding and Extrusion Materials |
| F477-02e1 | Standard Specification for Elastomeric Seals (Gaskets) for Joining Elastic Pipe |
| F679-03 | Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings |
2. American Water Works Association (AWWA):
- | | |
|--------------------|--|
| C104/ANSI A21.4-95 | Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water |
| C151/ANSIA21.53-00 | Standard for Ductile Iron Pipe, Centrifugally Cast for Water or Other Liquids |
| C153/A21.53 | Standard for Ductile Iron Compact Fittings for Water Service |

1.06 SUBMITTALS

- A. Provide manufacturer's product information (cut sheets), shop drawings, and O&M information for sewer materials including:
 - 1. Pipe
 - 2. Fittings
 - 3. Structures
 - 4. Castings
- B. Provide reports documenting pressure testing, mandreling, and televising.
- C. Provide copies of record drawings.

1.07 RECORD DRAWINGS

- A. Maintain record drawings that show the actual locations, sizes and types of utilities and other features encountered.
- B. Note any modifications to proposed sewer system size, location, or elevation. Record any other deviations from the drawings.

PART 2 MATERIALS

2.01 GENERAL

- A. Conform all materials to the size and type shown on the plans or as called for in the specifications and to applicable Laws, Codes, and Ordinances.
- B. All products and materials are to be new, undamaged, clean, and in good condition. Existing products and materials are not to be reused unless specifically indicated.
- C. Be responsible for the safe storage and handling of all materials utilized in the work. Store all materials in areas designated by the Owner's Construction Representative in cooperation with the Owner.
- D. Perform all work in accordance with any applicable manufacturer's instructions.

2.02 PIPE

- A. Provide the size, type, and class/schedule of pipe as indicated on the drawings.
- B. Use only pipe supplied from the same manufacturer, and of the same type, unless otherwise specified or approved in advance by the Engineer.
- C. Only pipe, joints, material and installation approved by Wisconsin Department of Natural Resources and/or the Department of Safety & Professional Services for the intended use in the State of Wisconsin shall be used.

2.03 PVC PIPE

- A. Conform to ASTM D3034 with solvent weld or elastomeric joints. Pipe shall be SDR-26, unless otherwise noted on the drawings.
- B. Do not mix different manufacturer's products, or fittings.
- C. Joints in PVC sewer pipe and fittings shall be elastomeric. Fittings shall be of standard manufacture; injection molded, and shall have a maximum standard dimension ratio (SDR) of 26.
- D. PVC pipe and fittings manufacturer shall have an experience record substantiating acceptable performance of the materials to be furnished.
- E. PVC pipe shall not be discolored.

2.04 Bedding/Initial Cover

- A. Provide 3/4-inch clear stone bedding and initial cover in accordance with the applicable requirements of Section 31 23 16.13 - Trenching.
- B. Sanitary sewer and sewer services shall be provided with 6 inches of bedding material and 12 inches of initial cover material (both measured at the bell of the pipe). Crushed stone bedding shall be used for both bedding and initial cover.
- C. Backfilling shall include 12 inches of gravel under roadways, consolidation by mechanical means to 95% standard Proctor density for imported granular material and 100% for excavated materials of existing material in the adjacent trench wall.

2.05 CONNECTIONS FOR DISSIMILAR PIPE MATERIALS

- A. Where new sewer connects to an existing dissimilar pipe, the connection shall be made with a no hub type coupling meeting the requirements of CISPI 310. Couplings shall have neoprene gaskets with stainless steel shield, and multiple stainless steel clamps with worm gear tightening device. The couplings shall be made specifically for the type and size of pipe materials being connected. Couplings shall be Fernco Strongback RC series with stainless steel hardware or approved equal.

2.06 MANHOLES

- A. General:
 - 1. Provide precast concrete manholes. Concrete block or cast-in-place manholes may only be used after receiving written approval by the City or Owner's Construction Representative and the Engineer for customized manhole sizes and shapes.
 - 2. Submit manufacturer's preproduction (shop) drawings for approval prior to the start of manufacturing.
 - 3. Contractor shall carefully locate all pipe locations, sizes, orientation and elevation prior to ordering new manholes. For sewer re-lays, verify if each pipe encountered is active. In-active pipe shall not be connected to the new sewer.
- B. Precast Manhole Sections:
 - 1. Precast concrete manhole sections, including bottom and top shall meet the requirements of ASTM C478.
 - 2. Unless otherwise noted, provide four 4-foot diameter manholes. If field conditions require a larger structure, contact the Owner's Construction Representative or Engineer.
 - 3. For 4-foot diameter manholes, provide eccentric cone top sections with a minimum clear opening of 24 inches. Flat top slabs may be used on manholes greater than 4 feet in diameter.
 - 4. Manhole wall thickness shall be minimum of 5 inches for 4-foot diameter manholes, 6 inches for 5-foot diameter manholes, and 7 inches for 6-foot and 7-foot diameter manholes.
 - 5. Manhole bottom section shall be pre-cast with integral base having a minimum thickness of 8 inches unless otherwise noted.

- C. Joints:
 - 1. Provide manhole riser and barrel sections, cones, and flat tops, with standard pipe section tongue and groove joints.
 - 2. Seal joints watertight with prefabricated rubber or plastic gaskets or formed in place butyl rubber seal.
 - 3. Joint sealers: EZ-stick, Kent Seal, Ram-Nek, or Mas-Stik butyl rubber gaskets or butyl rubber ropel, or approved equal.
 - 4. External Seals: The Owner's Construction Representative will determine which new manholes will receive an exterior joint wrap. If called for, the wrap shall be Mar-Mac Manufacturing Company MacWrap or an equal approved by the Owner prior, in writing.
- D. Connections:
 - 1. Openings for connections shall be cast-in-place or cored and appropriately sized for the type and size of pipe being connected.
 - 2. Provide flexible, watertight, pipe-to-manhole connections (or "boots") for sanitary sewers; Kor-N-Seal, Interpace, A-Lok, or an approved equal.
- E. Manhole Steps:
 - 1. Provide steps at 16-inch O.C. and project approximately 6 inches from wall.
 - 2. Unless otherwise indicated on the drawings, locate manhole steps over the downstream pipe opening.
 - 3. Manhole steps shall be steel reinforced polypropylene with 1/2-inch diameter deformed reinforcing bar. Steps shall be permanently secured in the manhole wall. Manhole steps shall be American Step Company, M.A. Industries, or approved equal.
- F. Bench and Flowline:
 - 1. Provide either a pre-cast or cast-in-place bench or flowline.
 - 2. Unless otherwise indicated on the drawings, bench height shall be 3/4 the diameter of the downstream pipe. Slope bench towards flowlines at a minimum 1/2 inch per foot. Provide light broom finish on bench. The bench shall extend to the top of the downstream pipe.
 - 3. Flowlines shall be formed with gradual, uniform sweeps directed towards the downstream pipe. Provide smooth, troweled finish for flowlines.
 - 4. When cast-in-place benches and flowline are used, lay the sewer pipe through the manhole.
- G. Adjusting Rings:
 - 1. All final grade adjustment of manhole covers and frame assemblies shall be completed utilizing precast concrete adjusting rings or an approved equal.
 - 2. Adjusting rings shall be mortared.

2.07 CASTINGS

- A. General:
 - 1. All manhole castings shall be heavy duty iron conforming to ASTM A48, Class 20 and rated for AASHTO H-20 loading. Provide water-tight, gasketed, self-sealing, non-rocking lids with two (2) concealed pickholes. If discrepancies exist between the specific castings in this specification and the plans, the plans shall govern.
 - 2. Standard Manhole Frame and Casting:
 - a. Neenah Foundry R-1550, with Type B lid; or approved equal.
 - 3. Low Profile Manhole Frame and Casting:
 - a. Neenah Foundry R-1689, with Type B lid; or approved equal.
 - 4. Standard Security Manhole Frame and Casting (Solid Lid):
 - a. Neenah Foundry Company R-1916-C with bolt down Type B lid; or approved equal. Lid shall be water tight, gasketed, self-sealing, with concealed pick-hole.
 - 5. Low Profile Security Manhole Frame and Casting (Solid Lid):
 - a. Neenah Foundry R-1689, with Type B lid having four (4) Type "E" countersunk flathead pent socket screws; or approved equal. Lid shall be water tight, gasketed, self-sealing, with concealed pick-hole.

6. Off-Street Castings:

- a. Off-street castings shall have bolt down lids. Bolt down castings shall be Neenah 1916-C castings. The casting shall be bolted to the manhole.

2.08 MANHOLE CHIMNEY SEAL

- A. Provide an external frame/cone seal meeting requirements of Sections 8.42.3-8.42.5 of the Standard Specifications for Sewer and Water Construction in Wisconsin for all manholes. Provide Type I flexible watertight frame/chimney joint with Cretex internal chimney seals.

2.09 PIPE INSULATION

- A. Rigid, closed-cell extruded polystyrene insulation. Insulation shall be suitable for buried insulation.
- B. Individual boards shall have dimensions of 8'x4'x2".
- C. Dow Styrofoam, or approved equal.

2.10 TRACER WIRE

- A. The tracer wire shall be installed on top of all PVC sanitary sewer laterals and taped at 6-foot intervals from the wye at the sewer main to the center of the terrace. A second wire shall be extended from the center of the terrace to the end of the lateral stubbed into the lot. A spool of excess wire shall be provided at the end of the lateral equal to one-half the depth of the lot for use by the building plumber at the time of building connection. The conductor shall be brought to the surface to a test box located directly above the sewer lateral in the center of the terrace between the back of the curb and the front of the sidewalk.
- B. Below grade splices are discouraged. If splices are necessary, the splice should be made with a 3M Scotchlok Self-Stripping Connector, or approved equal.
- C. A 12-gauge, solid copper, neoprene wrapped, green tracer wire shall be installed on top of all PVC sanitary sewer laterals.
- D. The end of the tracer wire at the sewer wye shall be connected to a 2-foot long, 5/8-inch diameter ground rod.
- E. Test Access Box: Taylor P200NFG or a Valvco CP Test Mini-box with "SEWER" stamped lid and tracer wire connection holes with stainless steel bolts. Lid shall have standard pentagonal head key.

2.11 MARKER POSTS

- A. Point of termination shall be marked with a 6-foot steel fence post with 1 foot of the post below the end of the lateral. A 6-foot 4'x4' treated wood post will also be installed at the end of each lateral with 3 feet of the post being buried below grade. The exposed portion of the post shall be painted green.

PART 3 EXECUTION

3.01 NOTIFICATION

- A. Contractor, prior to excavation work, shall notify all utilities, governmental agencies, or entities, known to, or which can reasonably be assumed to, have above or below ground pipe, conduit cables, structures or similar items within limits of project, to locate and mark location of such items. The Contractor shall expose potential pipe conflicts prior to installation of sewers to allow for any field changes to the design to be made.

3.02 BYPASS PUMPING

- A. Unless otherwise noted, all tributary buildings and services will remain occupied during construction. Wastewater will continue to be discharged to the sanitary sewers during construction. Contractor shall provide, operate and maintain all diversion and bypass pumping equipment necessary to carry out the work and allow wastewater to be discharged. Provide all necessary generators or other power source necessary to operate pumps on a continuous basis. Extra pumping and power equipment shall be staged onsite to maintain bypass pumping

in the event of failure of the primary bypass pumping equipment. The Contractor is solely responsible for wastewater bypassing.

3.03 BYPASS PLAN

- A. Contractor shall provide a wastewater bypass pumping plan indicating the order and schedule for completion of the work and associated bypassing provisions. The plan shall indicate the location of proposed bypassing, discharge locations, and the type and size of pumping equipment to be used. The plan shall describe contingencies to be used in the event of failure of the primary bypass pumps. Contractor's by-passing plan is subject to Owner's approval prior to implementation.

3.04 LAYING PIPE

- A. Install all pipe in accordance with ASTM specifications which pertain to the specified type of pipe material and the installation situation.
- B. Do not use any pipe or fittings cracked in cutting or handling or otherwise not free from defects.
- C. Clean all pipe of any dirt and/or debris both inside and out prior to placing in the trench.
- D. Make joints in accordance with manufacturer's directions with due care to avoid damaging pipe and/or disturbing previously laid pipe.
- E. Cut pipe only according to manufacturer's directions.
- F. Lay all sewer pipes to horizontal alignment and grade shown on the plans with bell ends up hill. Establish and maintain horizontal alignment using total station, transit or theodolite. Use pipe laser or level to establish and maintain grade of pipe. Discrepancies from the required horizontal alignment or grade at any location shall not be greater than 0.10 foot or 0.03 foot, respectively.
- G. Do not exceed specified trench widths.

3.05 BEDDING/INITIAL COVER

- A. Provide 3/4-inch clear stone bedding and initial cover in accordance with the applicable requirements of Section 31 23 16.13 - Trenching.
- B. Sanitary sewer and sewer services shall be provided with 6 inches of bedding material and 12 inches of initial cover material (both measured at the bell of the pipe). Crushed stone bedding shall be used for both bedding and initial cover.

3.06 MANHOLES

- A. Contractor shall determine the proper location, size, elevation, and orientation of all pipes entering new manholes before ordering. Do not connect abandoned pipes to new manholes. Manholes having improper location and/or orientation of the pipe connections will be rejected. Field repairs or adjustments of connection points are not permitted.
- B. Limit the excavation for manholes so as to provide only the necessary amount of space to sufficiently prepare the subgrade, set the base, set the manhole or structure, and lay pipe. Provide a minimum of 1 foot of clearance between structure and trench wall for adequate backfilling and compaction.
- C. Where excavation occurs below the bottom elevation of the structure's base, bring the excavation to the required elevation by the use of compacted crushed stone bedding. A minimum of 8 inches of compacted Crushed Stone Bedding shall be placed below manhole base.
- D. Set manhole base in accordance with elevation and location as indicated on the plans. Install base plumb and level. Install subsequent pre-cast manhole sections in accordance with shop drawing layout. Provide watertight gaskets between each manhole section.
- E. Pour inverts with smooth surface draining to downstream pipe. Where two or more lines meet at an angle, provide curved channel. Slope manhole bench at 2 inches/foot towards flow channel.

- F. Manholes shall be provided with between 4 inches and 8 inches of adjusting rings, with the top adjusting ring being 2 inches thick. Provide butyl sealant material between rings. Once rings are in place, tuck point the exterior joint and provide the entire exterior surface of the adjusting ring riser with a coating of mortar.
- G. When indicated on the drawings, the manhole frame shall be set with a Type I frame/chimney joint as specified in the Standard Specifications for Sewer and Water Construction in Wisconsin, latest edition. The frame and adjusting rings shall be sealed with an internal rubber sleeve as detailed in File 12A of the Standard Specifications.
- H. Drop manholes shall be constructed in accordance with File No. 19 of the Standard Specifications.
- I. At all manholes, 3/4-inch crusher run stone shall be installed from the top of the cone to the top of the casting.

3.07 CASTING INSTALLATION

- A. Install casting type as indicated on the plans or in the specifications.
- B. Provide butyl sealant material between last adjusting ring and casting base. Adjust casting elevation and slope to match adjacent proposed grades.

3.08 CONNECTIONS TO EXISTING STRUCTURES

- A. Make all necessary openings into existing structures or sewers including the reconstruction of existing inverts or benches, as necessary. Patch all openings permanently watertight with concrete brick and mortar, or hydraulic cement and waterstops, or for sanitary sewers, hydraulic cement and flexible watertight boots.

3.09 SEWER LATERALS

- A. Connect existing sewer laterals in accordance with all of the requirements of the sewer mains, including bedding, backfill, compaction, and jointing of the pipe. Connect sewer laterals to the sewer main by means of an approved "wye" fitting. Connect the new pipe to the existing lateral material using a no-hub coupling or approved transition fitting. Coupling/fitting shall be selected for the specific pipe material being connected.
- B. Based on local municipality requirements, cut-in type saddle wyes are not permitted on existing sanitary sewers where service laterals are to be connected to the sewer.
- C. Sewer lateral coordinates will be obtained via GPS by the Owner's Construction Representative during construction.
- D. All laterals shall have tracer wires from the main to the end.

3.10 PIPE INSULATION

- A. Provide insulation when indicated on the drawings, or where depth of cover is less than 6 feet. Unless otherwise noted, install 2-inch thick polystyrene boards for insulation over the pipe.
- B. Install insulation on compacted initial cover material, 6 inches above the top of the pipe. Stagger joints where more than one layer of insulation is required. Provide insulation with a minimum of 1 foot of initial cover material. Place cover and backfill material in manner that does not damage insulation; replace any damaged insulation.

3.11 LOCATOR TAPE

- A. The tracer wire shall be installed on top of all PVC sanitary sewer laterals and taped at 6-foot intervals from the wye at the sewer main to the center of the terrace. A second wire shall be extended from the center of the terrace to the end of the lateral stubbed into the lot. A spool of excess wire shall be provided at the end of the lateral equal to one-half the depth of the lot for use by the building plumber at the time of building connection. The conductor shall be brought to the surface to a test box located directly above the sewer lateral in the center of the terrace between the back of the curb and the front of the sidewalk.

3.12 DEFLECTION TESTING

- A. Test all PVC sewer pipe in the presence of the Owner's Construction Representative by a "go-no-go" deflection test mandrel furnished by the Contractor. Do not perform deflection testing any sooner than 30 days following the installation of the PVC pipe. Pull the mandrel by hand, or hand operated winch so as to avoid any damages to the pipe that may be caused by mechanized pulling equipment.
- B. Size the to test the pipeline for a maximum allowable internal deflection of the pipe (in any direction) of not to exceed 5 percent (5%) of the original internal diameter for the pipelines tested, regardless of how long after installation the testing takes place.
- C. Deflection testing may be done concurrently with any necessary televising of the sewers. When done concurrently with sewer televising, the mandrel may be pulled by mechanized equipment, provided the mandrel is visible in the television picture during the testing and the operation of the mandrel can be quickly halted before damage to the pipe occurs.
- D. Where poor trench soils conditions require the pipe excavation to be undercut and/or over excavated, the Owner's Construction Representative reserves the right to require an additional deflection test prior to the expiration of the Contractor's one year performance guarantee.
- E. Remove and replace all pipe that fails to pass the five (5) percent vertical deflection testing until the pipe passes the deflection test.

3.13 LEAKAGE TESTING

- A. All new sanitary sewer lines shall be leakage tested in accordance with Chapter 3.7.0 of Standard Specifications for Sewer and Water Construction.
- B. Air leak testing shall be used unless the ground water surface is greater than 2 feet above the top of the sewer pipe.

3.14 SEWER TELEVISION

- A. Upon completion of the sewer construction, all new sewers shall be televised to provide a record of the actual conditions inside the newly constructed sewers via closed circuit televising equipment. The City or Owner's Construction Representative may or may not be present during sewer inspections via this method.
- B. Utilize televising equipment with a color camera specially designed and equipped for the conditions of the sewers to be televised, and with a monitor screen. Provide equipment equipped with digital or DVD format so that the televised picture, any on-screen data, and any audio notes of the sewer inspection may be permanently recorded in digital or DVD format.
- C. Transport the camera equipment through the sewers by means of mechanical or hand operated winches, coordinated to provide speed and directional control necessary to fully observe the sewer interior. Provide a light source for the necessary illumination.
- D. Provide televising equipment equipped with an on-screen distance meter, capable of registering distances in the sewer from the starting manhole, and accurate to the nearest 0.5-foot station, so as to facilitate in the locating of sewer features and/or defects from the ground surface.
- E. Provide televising equipment with an on-screen date and time clock, so as to permit the verification of the date and time of the television inspection.
- F. Any video tapes of the sewer inspection shall contain audio notes describing the sewer location, direction of inspection, and a description of any pertinent features observed during the televised inspection (service locations, leaking or faulty joints, debris in the line, offset joints, etc.). In addition, record this information on a written log or record, in a format of the Contractor's choosing.
- G. The Contractor shall provide to the Owner's Construction Representative two (2) copies of the televising digital file or DVD.

END OF SECTION

**SECTION 33 40 00
STORM SEWER CONSTRUCTION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Storm sewer pipe and accessories.

1.02 RELATED SECTIONS

- A. Section 31 23 16.13 - Trenching
- B. Section 31 25 00 - Erosion Control

1.03 REFERENCES

- A. ASTM A615-89 – Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- B. ASTM C76-90 – Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
- C. ASTM D698-91 – Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 5.5-pound (2.5kg) Rammer and 12-inch (304.8-mm) Drop
- D. AASHTO M-198 – Joints for Circular Concrete Sewer and Culvert Pipe Using Flexible Water tight Gaskets
- E. AWWA C905 – PVC Pressure Pipe and Fabricated Fittings, 14 inches through 48 inches for Water Transmission and Distribution
- F. AWWA C906 – PE Pressure Pipe and Fittings 4 inches through 63 inches for Water Transmission and Distribution
- G. Where reference is made to the “Construction Specifications”, it shall be construed to mean the pertinent section of the City of Madison’s Standard Construction Specifications, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- H. Where reference is made to the “Standard Specifications”, it shall be construed to mean the pertinent section of the Standard Specifications for Sewer and Water Construction in Wisconsin, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- I. Where reference is made to the “State Specifications”, it shall be construed to mean the pertinent section of the Standard Specifications for Highway and Structure Construction, current edition, and all supplemental and interim supplemental specifications, as they may pertain, except the method of measurement and basis of payment shall not apply.
- J. Where reference is made to the “Geotechnical Report”, it shall be construed to mean the geotechnical report in Section 02 32 00.

1.04 REGULATORY AGENCIES

- A. City of Madison
- B. Wisconsin Department of Natural Resources (WDNR)

1.05 SUBMITTALS

- A. Submit product data under provisions of Section 01 33 23 - Submittals.
- B. Submit product data for pipe and pipe accessories.

1.06 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 01 33 00 - Submittals.
- B. Accurately record location of pipe runs, connections, manhole rim elevations and invert elevations.

1.07 MEASUREMENT AND PAYMENT

- A. Measurement and payment for storm sewer construction and related work specified herein shall be by unit price as shown on the Bid Form. Work shall include all labor, equipment and materials related to storm sewer construction.
 - 1. Lengths of storm sewer construction are from center of structure to center of structure.

PART 2 PRODUCTS

2.01 SEWER PIPE MATERIALS

- A. Reinforced Concrete:
 - 1. Pipe: Reinforced concrete pipe meeting requirements of ASTM C76 or ASTM C507. Provide Class III unless indicated otherwise in the Specifications or on the Drawings.
 - 2. Joints:
 - a. Circular Pipe: Tongue and groove meeting requirements of ASTM C443.
 - 3. Joint ties shall be in accordance with Detail Drawings.
 - 4. All Public Storm Sewer shall be concrete pipe.
- B. PVC Pipe:
 - 1. Conform to ASTM D3034 with solvent weld or elastomeric joints.
 - 2. Pipe shall be SDR-35, unless otherwise noted. Pipe over 15 inches in diameter shall meet the requirements of ASTM F679-03. Do not mix different manufacturer's products, or fittings.
- C. HDPE Solid Wall Pipe:
 - 1. Conform to ASTM D3350 for PE material with a cell classification of 335434C or better. Pipe shall be SDR 11, unless otherwise noted.
 - 2. Joints shall be thermal butt fusion in accordance with the manufacturer's recommendation.
- D. HDPE Corrugated Wall Pipe:
 - 1. Corrugated pipe with an integrally formed smooth liner.
 - 2. Pipes which are between 4-inch diameter and 36-inch diameter shall meet the requirements of AASHTO M252 and M294, Type S.
 - 3. Pipe and fittings shall be manufactured from virgin PE compounds conforming to the requirements of ASTM D3350, cell class 324420C.
 - 4. Joints for fittings and pipe shall be soil-tight bell and spigot, provided with rubber gasket. Rubber gasket shall be installed by the pipe manufacturer.

2.02 STORM SEWER PRE-CAST MANHOLES AND INLETS

- A. Frames, grates, and manhole lids shall be constructed and installed per the City's Construction Specifications and are considered incidental to the price of the structure.
 - 1. Manhole castings shall be Neenah R-1550 with non-rocking lids and Type D grates.
 - 2. Inlet castings shall be R-3067 with Type R grates at low points and where grades are less than 1%.

2.03 PRE-CAST STORM SEWER PIPE END SECTIONS AND WELDED GRATES

- A. Pre-cast apron end walls shall be provided and installed with hinged metal grates in accordance with Section 502 of the State Specifications. Apron end walls shall be provided with cut-off walls to prevent undermining.

2.04 BEDDING AND COVER MATERIAL

- A. Provide 3/4-inch clear stone bedding and cover material in accordance with the Drawings and Section 31 23 16.13 - Trenching.
- B. Granular Backfill material shall conform to the requirements of the Standard Specifications. Granular backfill shall be used under public and private pavement/walks and where shown in the plans unless otherwise directed by the Owner's Construction Representative based on geotechnical evaluation of native materials.

2.05 CRUSHED STONE

- A. Provide crushed stone base in accordance with the Drawings and Section 31 23 16.13 - Trenching.

2.06 LOCATOR TAPE

- A. Detectable metal locator tape shall be specifically manufactured for marking utilities.
- B. Tape shall be a minimum of 6 inches wide and shall be marked with "STORM".

2.07 DRAIN BASINS AND INLETS

- A. General:
 - 1. PVC surface drainage inlets shall include the drain basin type as indicated on the Contract Drawing and referenced within the Contract Specifications. The ductile iron grates for each of these fittings are to be considered an integral part of the surface drainage inlet and shall be furnished by the same manufacturer. The surface drainage inlets shall be as manufactured by Nyloplast, a division of Advanced Drainage Systems, Inc., or prior approved equal.
- B. Materials:
 - 1. The drain basins required for this contract shall be manufactured from PVC pipe stock, utilizing a thermoforming process to reform the pipe stock to the specified configuration. The drainage pipe connection stubs shall be manufactured from PVC pipe stock and formed to provide a watertight connection with the specified pipe system. This joint tightness shall conform to ASTM D3212 for joints for drain and sewer plastic pipe using flexible elastomeric seals. The flexible elastomeric seals shall conform to ASTM F477. The pipe bell spigot shall be joined to the main body of the drain basin or catch basin. The raw material used to manufacture the pipe stock that is used to manufacture the main body and pipe stubs of the surface drainage inlets shall conform to ASTM D1784 cell class 12454.
 - 2. The grates and frames furnished for all surface drainage inlets shall be ductile iron for sizes 8", 10", 12", 15", 18", 24", and 30" and shall be made specifically for each basin so as to provide a round bottom flange that closely matches the diameter of the surface drainage inlet. Grates for drain basins shall be capable of supporting various wheel loads as specified by Nyloplast. 12-inch and 15-inch square grates will be hinged to the frame using pins. Ductile iron used in the manufacture of the castings shall conform to ASTM A536 grade 70-50-05. Grates and covers shall be provided painted black.
 - 3. Where shown, the basins shall be provided with the sump specified.

PART 3 EXECUTION

3.01 HANDLING OF MATERIALS

- A. Handle materials with care to avoid damage. Do not dump or drop materials. Remove all damaged or flawed materials from the site.
- B. Arrange for suitable sites for material storage.

3.02 LINES AND GRADE

- A. Benchmarks and Construction Layout:
 - 1. Engineer will provide vertical and horizontal control.
 - 2. Contractor shall provide construction layout.
- B. Contractor shall provide all materials, equipment, and labor to maintain line and grade.
 - 1. The laser beam method is the preferred method for controlling line and grade. Equipment shall be operated in accordance with the manufacturer's instructions. A person who is competent with the operation of the laser equipment shall be present at the jobsite whenever it is being used.
 - 2. Grade boards may be used. Use straight and even-edged 2X6 boards nailed or clamped to substantial stakes on either side of the trench. Use stout twill line fastened at the center of the alignment, pulled sufficiently tight to remove any noticeable or measurable

sag. Measure down from the line to set the alignment of the pipe. Maintain a minimum of three boards at all times.

3. Banjo strings may be used only when approved by the Engineer.

3.03 JOINTS

- A. Construct joints as described herein and in accordance with manufacturer's installation instructions. Provide pipe joint type for soil tight, silt tight, or watertight only silt tight or watertight only watertight joint performance in accordance with the following table. The table applies only to the extent as applicable to the pipe and joint type and the joint performance as shown or specified.

Pipe and Joint Type	Joint Performance		
	Watertight	Silt Tight	Soil Tight
RCP:			
Rubber O-Ring Gasket	X	X	X
Bitumen or Butyl Rubber Sealant			X
HDPE			
Rubber Gasket:			
Hancor BLUE SEAL	X	X	X
ADS N-12 WT	X	X	X
Hancor Sure-Lok		X	X
ADS N-12 ST		X	X
Corrugated Coupling Bands:			
Hancor Hi-Q			X
ADS N-12			X
PE Wrap			X
PVC			
Restrained Gasket	X	X	X

3.04 UNSTABLE FOUNDATION

- A. Remove undesirable material below the trench bottom, such as organic soils, which cannot support the pipe. Replace the material with crushed stone meeting the requirements of Section 31 23 16.13 for 2-inch crushed stone base material.
- B. Crushed stone base material will be paid for at the unit price bid or on the basis of a negotiated price if there is no bid price. Payment for crushed stone base will be made only if the Owner's Construction Representative is notified prior to its placement. Payment will not be made for crushed stone base used for dewatering the trench.

3.05 LAYING OF PIPE

- A. Lay pipe uniformly to line and grade so that the finished sewer presents a uniform bore. Noticeable variations from true alignment and grade will be sufficient cause for rejection of the work.
- B. Commence at the lowest point and proceed to the upper end. Lay pipe with bell-end pointing up-grade.
- C. Provide a minimum of 6 inches between the pipe or box wall and the trench wall.
- D. Rest each pipe on the full length of its barrel. Place box culvert sections on 6 inches of bedding material.

- E. Do not lay the next pipe until the previous pipe is back-filled sufficiently to prevent movement during joining.
- F. Keep water out of the pipe. Do not let water rise into or around the pipe until the trench is filled at least one foot above the pipe.
- G. When work is stopped for any reason, securely plug the end of the pipe.
- H. Pipe Jointing: Assemble joints in accordance with the pipe manufacturer's instructions.

3.06 BEDDING AND COVER

- A. Use the following bedding sections as indicated on the Drawings.
- B. Class C:
 - 1. Provide a minimum of 6 inches of bedding material under the pipe barrel and four inches under the bell. Provide crushed stone bedding meeting requirements of Section 31 23 16.13. Spade or shovel-slice the material so that it fills and supports the haunch area and encases the pipe to the limits shown on the Drawing detail. If excavation is carried deeper than 6 inches below the pipe barrel, backfill the excess depth with 1½-inch crushed stone base material meeting requirements of Section 31 23 16.13.
 - 2. After the pipe has been laid and jointed, place cover material by hand or equally careful means around the sides of the pipe and up to a level 12 inches above the pipe. Provide cover material meeting the requirements of Section 31 23 16.13.
 - 3. For pipes 36 inches in diameter or larger, backfill material may be substituted for cover material. If backfill material is used, the bedding material shall extend to the spring line of the pipe.

3.07 SEPARATION FROM WATER MAIN

- A. Provide a minimum horizontal separation of 8 feet when constructing parallel to the water main.
- B. Vertical Separation:
 - 1. When a sewer crosses under a water main, provide a minimum of 6 inches between the bottom of the water main and the top of the sewer.
 - 2. When a sewer crosses over a water main, provide a minimum of 18 inches between the bottom of the sewer and the top of the water main.
- C. Excess excavated trench material shall be transported and disposed on site in a location approved by the Construction Coordinator. Trench excavation material cannot be cast into piles within the roadway.

3.08 MANHOLES, CATCH BASINS, INLETS, AND JUNCTION BOXES

- A. Construct drainage structures in accordance with details shown on Drawings and in accordance with Section 33 40 00, as applicable.
- B. Precast Sections:
 - 1. Install precast section with bases in accordance with Sections 33 40 00 and 33 30 00 or as shown on Drawings.
 - 2. Align pipe openings to that of the pipe entering and leaving the manhole, etc. Properly pipe with connections to manholes, etc., as shown on the Drawings.
- C. Construct Cast-In-Place sections as shown on the Drawings and in accordance with Section 03 30 00.
 - 1. Form bottom of excavation clean and smooth to correct elevation.
 - 2. Form and place cast-in-place concrete base pad, with provision for storm sewer pipe to be placed at proper elevation.
 - 3. Form and place cast-in-place concrete walls, sleeved at proper elevation to receive storm sewer pipe in accordance with details shown on Drawings.
- D. Invert channels shall be smooth and accurately shaped to a semicircular bottom conforming to the inside of the adjacent sewer section. Shape invert channels and structure bottoms with cement mortar. Changes in size and grade of invert shall be made gradually and evenly.

Changes in direction of the sewer entering branch or branches shall have a true curve of as large a radius as the manhole will permit.

END OF SECTION

Existing restroom trailer and electrical cabinet need to remain accessible to Metro employees

Provide temporary construction fencing around perimeter of staging area. Restore all landscape areas after use to its original condition.

CONSTRUCTION STAGING AREA

BUS CIRCULATION PATH
KEEP CLEAR

503A
178

BUS CIRCULATION PATH
KEEP CLEAR

The driveway must remain open at all times for buses and passengers to safely pass through.

**METRO TRANSIT
SOUTH TRANSFER STATION**
2430 S. Park St.

South Park Street

Attachment No. 4
pg. 1 of 1

West Badger Rd

**CONSTRUCTION STAGING
PLAN AT METRO SOUTH
TRANSFER STATION**

3/27/23 J. Whitney



April 27, 2023

ATTACHMENT NO. 5
3-pages

Matt Wachter
City of Madison DPCED
215 Martin Luther King Jr Blvd
Suite 130

Madison WI 53703
Via email: mwachter@cityofmadison.com

SUBJECT: Coverage Under WPDES General Permit No. WI-S067831-06: Construction Site Storm Water Runoff
Permittee Name: City of Madison DPCED
Site Name: Village On Park - Parking Structure & Site Improvements
FIN: 87809

Dear Permittee:

The Wisconsin Department of Natural Resources received your Notice of Intent on April 13, 2023, for the Village On Park - Parking Structure & Site Improvements site and has evaluated the information provided regarding storm water discharges from your construction site. We have determined that your construction site activities will be regulated under ch. 283, Wis. Stats., ch. NR 216, Wis. Adm. Code, and in accordance with Wisconsin Pollutant Discharge Elimination System (WPDES) General Permit No. WI-S067831-06, Construction Site Storm Water Runoff. All erosion control and storm water management activities undertaken at the site must be done in accordance with the terms and conditions of the general permit.

The **Start Date** of permit coverage for this site is April 27, 2023. The maximum period of permit coverage for this site is limited to 3 years from the **Start Date**. Therefore, permit coverage automatically expires and terminates 3 years from the Start Date and storm water discharges are no longer authorized unless another Notice of Intent and application fee to retain coverage under this permit or a reissued version of this permit is submitted to the Department 14 working days prior to expiration.

A copy of the general permit along with extensive storm water information including technical standards, forms, guidance and other documents is accessible on the Department's storm water program Internet site. To obtain a copy of the general permit, please download it and the associated documents listed below from the following Department Internet site:
<http://dnr.wi.gov/topic/stormwater/construction/forms.html>

- Construction Site Storm Water Runoff WPDES general permit No. WI-S067831-06
- Construction site inspection report form
- Notice of Termination form

If, for any reason, you are unable to access these documents over the Internet, please contact me and I will send them to you.

To ensure compliance with the general permit, please read it carefully and be sure you understand its contents. Please take special note of the following requirements (This is not a complete list of the terms and conditions of the general permit.):

1. The Construction Site Erosion Control Plan and Storm Water Management Plan that you completed prior to submitting your permit application must be implemented and maintained throughout construction. Failure to do so may result in enforcement action by the Department.
2. The general permit requires that erosion and sediment controls be routinely inspected at least every 7 days, and within 24 hours after a rainfall event of 0.5 inches or greater. Weekly written reports of all inspections must be maintained. The reports must contain the following information:
 - a. Date, time, and exact place of inspection;
 - b. Name(s) of individual(s) performing inspection;
 - c. An assessment of the condition of erosion and sediment controls;
 - d. A description of any erosion and sediment control implementation and maintenance performed;
 - e. A description of the site's present phase of construction.
3. A **Certificate of Permit Coverage** must be posted in a conspicuous place on the construction site. The Certificate of Permit Coverage (WDNR Publication # WT-813) is enclosed for your use.
4. When construction activities have ceased and the site has undergone final stabilization, a Notice of Termination (NOT) of coverage under the general permit must be submitted to the Department.

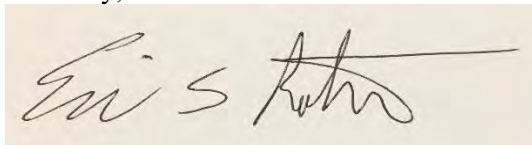
It is important that you read and understand the terms and conditions of the general permit because they have the force of law and apply to you. Your project may lose its permit coverage if you do not comply with its terms and conditions. The Department may also withdraw your project from coverage under the general permit and require that you obtain an individual WPDES permit instead, based on the Department's own motion, upon the filing of a written petition by any person, or upon your request.

If you believe that you have a right to challenge this decision to grant permit coverage, you should know that the Wisconsin statutes and administrative rules establish time periods within which requests to review Department decisions must be filed. For judicial review of a decision pursuant to ss. 227.52 and 227.53, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to file your petition with the appropriate circuit court and serve the petition on the Department. Such a petition for judicial review must name the Department of Natural Resources as the respondent.

To request a contested case hearing pursuant to s. 227.42, Wis. Stats., you have 30 days after the decision is mailed, or otherwise served by the Department, to serve a petition for hearing on the Secretary of the Department of Natural Resources. All requests for contested case hearings must be made in accordance with s. NR 2.05(5), Wis. Adm. Code, and served on the Secretary in accordance with s. NR 2.03, Wis. Adm. Code. The filing of a request for a contested case hearing is not a prerequisite for judicial review and does not extend the 30-day period for filing a petition for judicial review.

Thank you for your cooperation with the Construction Site Storm Water Discharge Permit Program. If you have any questions concerning the contents of this letter or the general permit, please contact Eric Rortvedt at (608) 235-7655.

Sincerely,

A handwritten signature in black ink on a light-colored rectangular background. The signature appears to read "Eric S. Rortvedt" in a cursive, flowing script.

Eric S. Rortvedt, P.E.
South Central Region
Storm Water Program

ENCLOSURE: Certificate of Permit Coverage

Cc: Matt Saunders, JSD (via email)
James Whitney, City of Madison DPCED (via email)



CERTIFICATE OF PERMIT COVERAGE

UNDER THE WPDES CONSTRUCTION SITE STORM WATER RUNOFF PERMIT Permit No. WI-S067831-06

Under s. NR 216.455(2), Wis. Adm. Code, landowners of construction sites with storm water discharges regulated by the Wisconsin Department of Natural Resources (WDNR) Storm Water Permit Program are required to post this certificate in a conspicuous place at the construction site. This certifies that the site has been granted WDNR storm water permit coverage. The landowner must implement and maintain erosion control practices to limit sediment-contaminated runoff to waters of the state in accordance with the permit.

EROSION CONTROL COMPLAINTS should be reported to the WDNR Tip Line at **1-800-TIP-WDNR (1-800-847-9367)**

Please provide the following information to the Tip Line:

WDNR Site No. (FIN): 87809

Site Name: Village On Park - Parking Structure & Site Improvements

Address/Location: 808 Hughes Place, City of MADISON

Additional Information:

Landowner: City of Madison DPCED

Landowner's Contact Person: Matt Wachter

Contact Telephone Number: (608) 266-4635

Permit Start Date: April 27, 2023

By:



City of Madison Engineering Division

EROSION CONTROL PERMIT

ATTACHMENT NO. 6
2-pages

Permit Number: ENG100-2023-03674

City Engineering: (608) 266-4751

Location of Work: 2300 S Park ST

Permittee: Matthew Wachter

Owner: CITY OF MADISON CDA


Telephone: (608) 266-4635

Telephone:

Parcel: 070935204069

Email:

mwachter@cityofmadison.com

FEE SCHEDULE		APPROVALS		
Full Plan Base Fee	200.00	Plan Review:	MAE	
Total Disturbed Area Fee	515.00	Issuance:	MAE	Call 811 or (800) 242-8511 (262) 432-7910 (877) 500-9592 (emergency only)
Total Fee Amount	715.00			
<hr/>				
Total Invoiced Amount	715.00			
Paid	715.00			
Balance Due	0.00			

PROPOSED WORK: Village on Park Parking Structure

Project Description:

Permit Type: Full Plan

Construction Start Date: 5/1/2023

Permit Expiration Date: 12/31/2024

Seed Sod Restore Date: 5/1/2024

USLE Rate: 5

Total Disturbed Area: 103,000

☐ EC Checklist Attached

☒ EC Plan Attached

☐ Pumping Plan Attached

FOR CITY OF MADISON USE ONLY: APPROVED

Megan Eberhardt

04/27/2023

- Erosion Control Permit Reviewer

Date

Full Plan

See page two of this permit for Permit Conditions and Requirements.



City of Madison Engineering Division

EROSION CONTROL PERMIT

Permit Number: ENG100-2023-03674

City Engineering: (608) 266-4751

Location of Work: 2300 S Park ST

Permittee: Matthew Wachter

Owner: CITY OF MADISON CDA

Telephone: (608) 266-4635

Telephone:

Parcel: 070935204069

Email:

mwachter@cityofmadison.com

Permit Conditions and Requirements:

Failure to abide by any of the following permit conditions will be considered a violation of the City's Erosion Control Ordinance (MGO Ch. 37) and can result in the issuance to the permittee and/or the property owner of Official Notices, citations, and/or referral to the City Attorney for resolution of non-compliance.

Erosion & Sediment Control Measures are to be installed prior to any land disturbance activities.

Within ten (10) days of the completion of the project or site stabilization the applicant shall submit an Erosion Control Notice of Termination (ECNOT). The ECNOT should be sent to the administrative authority that initially approved your permit.

The Erosion Control Permit applicant shall conduct a pre-construction meeting attended by a Professional Engineer responsible for initial implementation certification of the erosion control plan. The Professional Engineer shall document and submit minutes of this meeting to City Engineering.

A Professional Engineer currently licensed in the State of Wisconsin shall certify the initial installation and implementation of the measures shown on the approved erosion control plan. Documentation on the City's Installation Certification form shall be submitted to the administrative authority within one (1) week of the installation. The certification form can be found on the City's webpage at <http://www.cityofmadison.com/engineering/Permits.cfm>.

As part of the Erosion Control Permit requirements this construction project requires erosion control inspections and reporting by the permittee (or by their authorized inspector). Inspections shall be conducted a minimum of once per week and also after every 24-hour rain event of 0.5" or more precipitation. The results of these inspections shall be entered on the City's permit and inspection tracking system.

Dust Control, if applicable shall be provided, per WDNR Conservation Practice Standard 1068.

Trench Dewatering, if applicable shall be provided, per WDNR Conservation Practice Standard 1061.

All BMP's installed for erosion control shall be in accordance with the applicable WDNR Conservation Practice Standards found at: http://dnr.wi.gov/topic/stormwater/standards/const_standards.html





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Failure to abide by any of the following permit conditions will be considered a violation of the City's Storm Water Management Ordinance (MGO Ch. 37) and can result in the issuance of Official Notices, citations, and/or referral to the City Attorney for resolution of non-compliance.

A Professional Engineer currently licensed in the State of Wisconsin shall certify the initial installation and implementation of the Best Management Practices (BMPs) shown on the approved stormwater management plan. Documentation shall be submitted to the administrative authority using the standard forms available from City Engineering and found on the City's website at <http://www.cityofmadison.com/engineering/Permits.cfm>.

Any property owner required to have a Storm Water BMP or maintenance agreement on the property as part of a stormwater management plan shall submit to the administrative authority an annual report reviewing the condition of the practice(s) and the maintenance performed during the past calendar year. This report shall be submitted and sealed by a Professional Engineer currently licensed in the State of Wisconsin per MGO Chapter 37.

Erosion Control and Stormwater Management Notes

Village on Park Parking Structure

4/27/2023 J. Whitney

Attached is your City of Madison Erosion Control and Stormwater Management Permits and receipts for the **"Village on Park Parking Structure and site improvements"** project at 2300 S Park St. Please note the permit conditions on page 2 of the permit PDF, including the following notes.

- Erosion & Sediment Control Measures are to be installed prior to any land disturbance activities.
- It is the responsibility of the Contractor to provide notice to EC permit applicant or as the permit applicant to adhere to MGO 37.11(4)(d). The permittee shall give two (2) working days' notice to the Administrative Authority (City Engineering) in advance of the start of any activity.
- A Professional Engineer currently licensed in the State of Wisconsin shall certify the initial installation and implementation of the measures shown on the approved erosion control plan. Documentation on the City's Installation Certification form shall be submitted to the administrative authority within one (1) week of the installation. The certification form can be found on the City's webpage at <http://www.cityofmadison.com/engineering/Permits.cfm>

This permit requires weekly AND post-rain inspections and reporting by the permit holder or their authorized inspector(s). Currently I have **Matt Wachter** listed as the Authorized Inspector.

In order to access the City system for inspection reporting, an account at [Accela Citizen Access \(ACA\)](#) is required. Attached is our ACA Help Guide for creating an account and how to enter inspection reports. **New accounts require being manually linked to a permit. After creating an account, please email me back so I can link the permit to your active account.** Once your account is linked to the permit, you will be able to access and enter inspection reports.

If someone else will be completing the required erosion control inspection and reporting, please email me with their contact information AFTER they have set up an account in ACA and I will link them to the permit.

For informational purposes, our Standard Operation Procedures are attached and explain how enforcement of erosion control permit requirements and conditions are handled.

If you have an updated construction start time and/or need to revise the estimated restoration date, please let us know so we can update the permit accordingly. A renewal fee will be charged if the permit is allowed to expire and land disturbance continues past the expiration date.

Please contact me if you have questions.

Megan Eberhardt, P.E. (she/her)
Engineer IV
City of Madison-Engineering Division
City-County Building, Room 115
210 Martin Luther King, Jr. Blvd.
Madison, WI 53703-3342
MEberhardt@cityofmadison.com

**City of Madison Engineering Erosion Control Enforcement
Standard Operation Procedures & Common Requirements (Updated 6/16/2015)**

*To better provide uniform oversight and obtain erosion control compliance on projects
under the City Engineering's jurisdiction for inspection and enforcement.*

1. Warnings will be provided twice during the duration of a project for erosion control violations of MGO Ch 37. Any violations after the two warnings will result in the issuance of a citation.
2. Non-compliance violations and warnings for administrative and field items will be tracked separately.
3. Administrative non-compliance shall include, but not be limited to: failure to hold a required preconstruction meeting, failure to submit erosion control plan initial implementation certification form, failure to complete weekly inspection report, or failure to complete a post-rain event inspection report.
4. For permitted projects that are required to submit weekly inspection reports, compliance checks are run automatically every Monday morning at 6:00 AM. To be considered in compliance, an online inspection report must be completed before this automatic compliance check is performed. Property owners, applicants, and authorized inspectors will receive an automatic email notice that the required inspection report has not been completed. **This is not to be considered a reminder system; if this email notice is sent, the site is already in non-compliance.**
5. Post-rain event inspection report compliance will be run manually by City Engineering 48 hours after the rain event day. Notices of non-compliance will be sent to property owners, applicants, and authorized inspectors for permitted projects that have not completed the required inspection report.
6. Property owners, applicants, and their authorized inspectors will **NOT** be reminded by City Engineering when a rain event requiring inspection occurs (0.5 inches or larger). The permit holder or their authorized inspector(s) will need to check for rainfall amounts. The rain gauge closest to the construction site should be used to determine rainfall amount.
West Side: http://infosyahara.org/rainfallgauges_station2
East Side: <http://w1.weather.gov/data/obhistory/KMSN.html>

In the event the closest rain gauge is out of order, the gauge for the other side of town shall be referenced. If both gauges are out of order, default to the "Madison Area" Location on the National Weather Service website: <http://www.nws.noaa.gov/climate/xmacis.php?wfo=mkx>

Rain gauges at the construction site or any other location will not be acceptable, as they cannot be verified by City inspection staff in a timely manner.

7. Field non-compliance shall include, but is not limited to: land disturbance work without a permit, working without erosion control measures installed, improperly installed erosion control measures, failure to maintain erosion control measures, tracking of sediment onto adjacent streets or property, discharge of silt laden runoff or pump discharge from the site, etc.
8. Field violations will generate warnings from the City inspector that will be conveyed on-site to the project superintendant (if available) and by email notice to the property owner, applicant, and authorized inspector.
9. If the usual notice and citation methods fail to result in the permitted site being brought into compliance with MGO Ch 37 requirements, additional enforcement measures such as, but not limited to, stop work orders or referral to the City Attorney will be used.
10. In the case of a safety hazard, City inspection staff will attempt to obtain immediate corrective action to remedy on the part of the contractor, property owner, or applicant. If immediate action is not available (unable to contact, or parties refuse to comply immediately), then City Engineering will take measures necessary to correct the hazard. These costs will be billed to the property owner as a special charge per Madison General Ordinances. In the case of a refusal to comply, this will result in an immediate field violation and issuance of a citation as well.

Registration/Logging In

NOTE: If you have already registered you can skip this section.

NOTE: The account you create will last for 400 days from the date of the last login.

NOTE: City of Madison Licenses & Permits link:

<https://elam.cityofmadison.com/citizenaccess/>

Registration

To register for an account with the City of Madison Licenses and Permits, click on **Register for an Account**.



Disclaimer

Read the disclaimer, and if you agree check the box below the disclaimer and click **Continue Registration**.

Account Registration

Anyone can use this site to research licenses & permit records and related activities, however, only registered users can use this site to apply for permits or request inspections.

Contractors, Architects, and Engineers will benefit from registering as they will gain a listing of the most recent permits associated to their license once they have added their license information to their account. Adding the license information can be done in Account Management upon login. This will provide the ability for appropriately licensed professionals to request inspections and purchase some permit types online, too.

It will be helpful if you have the following information available before continuing:

- Choose a user name and password
- Enter account and contact information
- Add Professional Licenses (optional)

General Disclaimer
Please use the following links to view the disclaimers.
[Conditions & Use](#)
[Accessibility](#)
[Privacy](#)
[Security Policy](#)
Once you have viewed the appropriate disclaimers check the 'I have read and
☐ I have read and accepted the above terms.
Continue Registration »

Enter Account Information

On the next screen enter the pertinent information to setup an account, and click **Continue Registration**.

NOTE: Please be as complete as possible in filling out fields.

NOTE: It is important to supply a valid email address. Successful completion of this process will end with a validation email sent to this address. This email allows the activation of the account.

The screenshot shows a web form for account registration. It is divided into two main sections: 'Login Information' and 'Contact Information'. The 'Login Information' section includes fields for 'User Name' (with a note that it can be 4-32 characters), 'Email Address', 'Password' (8-30 characters), 'Type Password Again', 'Select a Security Question' (a dropdown menu), and 'Answer' (20 characters maximum). The 'Contact Information' section includes fields for 'First', 'Middle', and 'Last' names, 'Name of Business', 'Address Line 1', 'City', 'State' (a dropdown menu), 'Zip', 'Home Phone', 'Work Phone', 'Mobile Phone', 'Fax', and 'Preferred Method of Contact' (a dropdown menu).

Success

The success screen will be displayed. An email will be sent to the email address entered during the registration process.

Activate

You will receive an email after entering your account information, with a link at the bottom for account activation. Click the link to activate your account.

NOTE: Check your emails SPAM/JUNK folder if you don't find the email in your Inbox.

Once the link is clicked a browser window will open to City of Madison Licenses & Permits Login screen, and a welcome email is sent with the link to City of Madison Licenses and Permits website for future use.

Logging In

To login, click on Login in the upper right hand corner, then enter the User Name and Password that you selected when registering.

NOTE: The User Name or E-Mail box will accept either the user name you created when registering or the email address you used when registering.

The screenshot shows the homepage of the City of Madison Licenses & Permits portal. At the top, there is a navigation bar with links: HOME, MY ACCOUNT, SERVICES, AGENCIES, CONTACT US, and a search bar. Below this is a large banner with the text "CITY OF MADISON LICENSES & PERMITS" and a sub-header "City of Madison Licenses & Permits". The banner also features a list of services: Clerk, Development Services Center, Engineering, Fire Prevention, Parks, Public Health, Street Vending & Sidewalk Cafes, and Support Center. On the right side of the banner, there are links for "Register for an Account" and "Login". Below the banner, there is a section titled "CITY OF MADISON LICENSES & PERMITS" with a welcome message: "We are pleased to offer our customers access, 24 hours a day, 7 days a week, to the Licenses & Permits portal."

ACCOUNT VERIFICATION

Welcome. If you are an existing user, please enter your user name and password in the LOGIN box. To add a license to your account, please click on the Account Management link after login and follow the prompts.

If you've forgotten your password, please click on the "I've forgotten my password" link, enter your email address and a new password will be sent to you. Please be sure to change your password once you have logged in with the password we have provided for you.

New Users

If you do not have an account, but would like to apply for a permit, you will need to register for an account. Please click on the "Register Now" button below to register. Once you have an account, you will have the added benefits of seeing a history of applications, access to invoices and receipts, checking on the status of pending activities, and more.

The screenshot shows the Login form. It has a title "Login" and two input fields: "User Name or E-mail:" and "Password:". Both fields are highlighted with a red border. Below the input fields is a "Login »" button. There is also a checkbox labeled "Remember me on this computer". At the bottom, there are two links: "I've forgotten my password" and "New Users: Register for an Account".

Inspections

This section covers how to complete an inspection for an Erosion Control Permit.

If you are the contractor associated with the permit, and this is your first time using the system, you will need to contact City Engineering staff to link the project to your account.

If you are a third party inspector who will be performing inspections for a contractor, and this is your first time performing inspections for the contractor, once your account has been created, contact the contractor to be granted access to their projects (assigned as a delegate to their online account).

NOTE: for steps to add a delegate click [here](#).

Once logged in, to access the Erosion Control Permit, click on either the **Permitting** tab or **Search Permit Application** to see a list of permits associated with your account.

The screenshot shows the user interface of the City of Madison Licenses & Permits system. At the top, there is a navigation bar with three tabs: 'Home', 'Permitting', and 'Licenses/Registrations'. Below the navigation bar, the user is greeted with 'Welcome Jeff Moyer' and 'You are now logged in.' To the right, there is a 'Cart (0)' section indicating 'Your cart is empty.' Below the welcome message, it says 'To get started, select one of the services listed below:'. There are two main service categories: 'Permitting' and 'Licenses/Registrations'. Under 'Permitting', there are links for 'Search Permit Applications', 'Obtain a Fee Estimate', and 'Apply for a Permit'. Under 'Licenses/Registrations', there are links for 'Apply for a License/Registration', 'Search Licenses/Registrations', and 'Renew Rental Property Contact'.

Home	Permitting	Licenses/Registrations
Welcome Jeff Moyer You are now logged in.		
Cart (0) Your cart is empty.		
To get started, select one of the services listed below:		
Permitting Search Permit Applications Obtain a Fee Estimate Apply for a Permit		Licenses/Registrations Apply for a License/Registration Search Licenses/Registrations Renew Rental Property Contact

The list of permits will contain all permits and inspections associated with your account. If you are a delegate for another user you will also see their permits and inspections.

NOTE: for steps to add a delegate click [here](#).

The Erosion Control permits will display an **Amendment** button under the **Action** column. To complete the Inspection for the associated Erosion Control permit click on the **Amendment** button.

NOTE: The Permit list may get quite long. It may help to sort the list. Click a column header once to sort the list by that column ascending. Click a column header twice to sort the list by that column descending.

For instruction on how to search for a permit click [here](#).

For instruction on how to create a collection of Active Erosion Control permits click [here](#).

Home

Permitting

Licenses/Registrations

[Search Permit Applications](#)

[Obtain a Fee Estimate](#)

[Apply for a Permit](#)

Records

Showing 1-1 of 1

[Add to collection](#)

[Add to cart](#)

[Copy Record](#)

Show on Map



<input type="checkbox"/>	Date	Record Number	Record Type	Description	Project Name	Status	Action
<input type="checkbox"/>	12/17/2012	ENG100-2012-01486	Engineering - Erosion Control	fgdfgsdfg		Permit Issued	Amendment

Completing an Inspection

After clicking the Amendment button the first of 3 steps that needs to be completed is selecting a Contractor on the Inspection Information step.

Using the Auto-fill is the easiest way to populate this information. You can select from your account information, associated contacts, or delegates.

Note: for steps to add a delegate click [here](#).

After the required information is completed click on the **Continue Application** button.

Step 1 : Create a New Inspection > Select Inspector

Using the Auto-fill is the easiest way to populate this information. You can select from your account information, associated contacts, or delegates.

* indicates a required field.

Authorized Inspector

☒ Auto-fill with

Jeff Moyer

* First:

Jeff

Name of Business

* Address Line 1:

201 Main St

--Logged In User Account Information--

Jeff Moyer

--Associated License--

DOROWS SEPTIC SERVICE - 1098

--Associated Contact--

AARON THOMPSON

Jeff Moyer

The next step is to enter the **Inspection Details**. The **Details** section is completed by filling in the appropriate information and the **Attachment** section is used for uploading needed documentation or photos for the Inspection.

Each BMP in the Items section needs to be updated with the inspection result. If a new condition needing inspection arises, you may need to add an additional BMP to the inspection record. Do not delete active BMPs. Note them as not applicable.

Details on this are below.

Engineering - Erosion Control Inspection

1 Create a New Inspection

2 Review

3 Application Submittal

Step 1: Create a New Inspection > Enter Inspection

Please enter the date the inspection occurred and the reason for the inspection. You may also enter any relevant weather information.

Each BMP in the Inspection Items section needs to be updated. You can update each BMP individually from the [Actions](#) link or update them as a group by placing a checkmark next to all the records you wish to update then click Edit Selected.

* indicates a required field.

Inspection Information

INSPECTION DETAILS

*Inspection Date:

*Reason for Inspection:

--Select--

Weather Notes:

[spill check](#)

Inspection Items

BMP

Showing 1-5 of 5

<input type="checkbox"/> Category	BMP	Description	Condition	Comments	Actions
<input type="checkbox"/>	Construction Entrance	Rock Construction/Tracking Pads	Rock construction tracking pad		Actions
<input type="checkbox"/>	Perimeter Control	Silt Fence	Standard Silt Fence		Actions
<input type="checkbox"/>	Inlet Protection	Inlet Protection	Standard Inlet Protection		Actions
<input type="checkbox"/>	Temporary Slope Stabilization	Erosion Control Mats	Erosion Control Mats		Actions
<input type="checkbox"/>	Velocity Check	Stone Check Dam	Min 2 feet high, 3-6 inches R/P R/P w/ 1 foot Thickness of 2 inch on upstream side		Actions

Add a Row

Edit Selected

Delete Selected

Attachment

After selecting the files you wish to attach please click Save before Continuing. Permitting Information.

Name	Type	Size	Latest Update	Action
------	------	------	---------------	--------

No records found.

[Browse](#)

[Continue Application](#)

Save and resume later: 

Each Item needs to be updated with the inspection result. There are 2 ways to update items:

An individual update is accomplished by clicking the Actions button and selecting Edit.

Category	BMP	Description	Condition	Comments
<input type="checkbox"/> Construction Entrance	Rock Construction/Tracking Pads	Rock construction tracking pad		
<input type="checkbox"/> Perimeter Control	Silt Fence	Standard Silt Fence		
<input type="checkbox"/> Inlet Protection	Inlet Protection	Standard Inlet Protection		
<input type="checkbox"/> Temporary Slope Stabilization	Erosion Control Mats	Erosion Control Mats		
<input type="checkbox"/> Velocity Check	Stone Check Dam	Min 2 feet high, 3-6 inches RIP RAP w/ 1 foot Thickness of 2 inch on upstream side		

Buttons: Add a Row, Edit Selected, Delete Selected

A multiple update is accomplished by placing a checkmark in the checkbox next to all the records you wish to update then clicking Edit Selected.

Category	BMP	Description	Condition	Comments
<input checked="" type="checkbox"/> Construction Entrance	Rock Construction/Tracking Pads	Rock construction tracking pad		
<input checked="" type="checkbox"/> Perimeter Control	Silt Fence	Standard Silt Fence		
<input checked="" type="checkbox"/> Inlet Protection	Inlet Protection	Standard Inlet Protection		
<input type="checkbox"/> Temporary Slope Stabilization	Erosion Control Mats	Erosion Control Mats		
<input type="checkbox"/> Velocity Check	Stone Check Dam	Min 2 feet high, 3-6 inches RIP RAP w/ 1 foot Thickness of 2 inch on upstream side		

Buttons: Add a Row, Edit Selected, Delete Selected

In either case a window will form will open that will allow you to update each item.

When the changes are complete click the **Submit** button to close the form and continue.

When all updates are complete for the Inspection Information click the **Continue Application**.

The next step is Review of the information submitted. Verify the information, and check to make sure that files that you uploaded are listed. Click the **Continue Application**.

The last page informs you that you were successful.

Appendix A

Add a Delegate

A delegate can perform actions in City of Madison Licenses & Permits on your behalf.

To add a delegate to your account or manage account information, click on the **Account Management** button. In Account Management click on **Add a Delegate**.

The following form will display. Complete the form and click the **Invite a Delegate** button to send an invitation to the email selected. The email address must be an email address that is registered with City of Madison Licenses & Permits.

An email will be sent and the recipient must agree to be a delegate.

Edit any of the information by clicking the “Edit” button next to the desired information.

Manage Your Account

Your current account information is shown below. Click an Edit button to update information within a section.

Account Type

Licensed Professional Account

Login Information

Edit

User Name:

e-Mail:

Password:

Security Question:

Contact Information

Edit

Jeff Public

Home Phone:

Personal

Work Phone:

1

Mobile Phone:

2

Fax:

3

E-mail

4

License Information

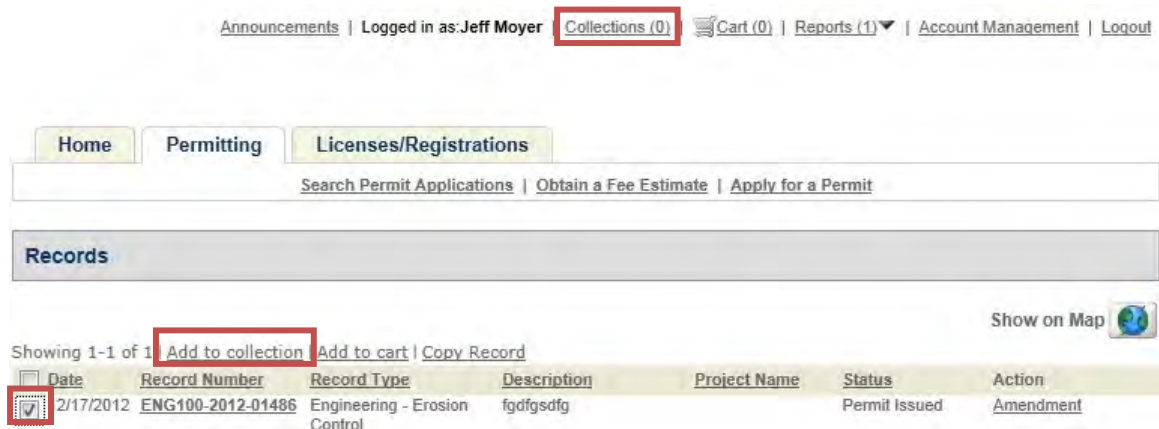
You may add professional license(s) to your public user account by clicking the Add a License button. Your professional license(s) may need to be validated by the agency before you can use it.

Appendix B

Create Active Erosion Control Collection

A collection is a quick way to group and search for records used often.

Once logged in, to access the Erosion Control Permit, click on either the **Permitting** tab or **Search Permit Application** to see a list of permits associated with your account.



To add a permit(s) to a collection check the checkbox next to the desired permits. Click the Add to collection button. At this point you can create the Active Erosion control Permits collection if it doesn't exist. If it does exist you can select it from the Existing Collection drop down.



Easily access/manage a collection by clicking on the **Collections** button on the toolbar across the top of your screen.

Appendix C

Permit Search

Search for Records

Enter information to search the City of Madison's Licenses & Permit Records. Search for records by entering in any combination of the following information:

- Site Address
- Contractor License Information
- Permit Type

Use the General Search dropdown menu to change the Search type if you would like to search by Address or Licensed Professional.

General Search General Search

☐ Search my records only

Permit Type:
--Select--

Record Number:

Project Name:

Start Date:
02/19/1961

End Date:
02/26/2013

Street No.:

Direction:
--Select--

Street Name:

Street Type:
--Select--

Unit Type:
--Select--

Unit No.:

Parcel No.:

City:

State:
--Select--

Zip:

License Type:
--Select--

License Number:

Name of Business:

Business License #:

First:

Last:

Search

Clear


Based on the type of search selected, type in the appropriate information then click the **Search** button and the results will be displayed.

Note: selecting the **Search my records only** checkbox will limit the search results to records associated with your account.

Note: selecting the **Permit Type** of Erosion Control will limit the search results to records that are Erosion Control.

21 Record results matching your search results

Click any of the results below to view more details.

Show on Map 

Showing 1-10 of 21 | [Add to collection](#) | [Add to cart](#)

<input type="checkbox"/>	<u>Date</u>	<u>Record Number</u>	<u>Record Type</u>	<u>Description</u>	<u>Project Name</u>	<u>Status</u>	<u>Action</u>
<input type="checkbox"/>	02/12/2013	ENG100-2013-00234	Engineering - Erosion Control	Internal AA Check		Inspection Failed	
<input type="checkbox"/>	02/12/2013	ENG100-2013-00218	Engineering - Erosion Control			Permit Issued	Amendment
<input type="checkbox"/>	02/08/2013	ENG100-2013-00216	Engineering - Erosion Control			Open	
<input type="checkbox"/>	02/08/2013	ENG100-2013-00215	Engineering - Erosion Control			Open	
<input type="checkbox"/>	02/08/2013	ENG100-2013-00214	Engineering - Erosion Control			Open	
<input type="checkbox"/>	02/08/2013	ENG100-2013-00213	Engineering - Erosion Control			Open	
<input type="checkbox"/>	02/08/2013	ENG100-2013-00212	Engineering - Erosion Control			Open	
<input type="checkbox"/>	02/08/2013	ENG100-2013-00211	Engineering - Erosion Control			Open	
<input type="checkbox"/>	01/24/2013	ENG100-2013-00140	Engineering - Erosion Control	11th Addition to Nine Springs WWTP		Maintenance Needed	
<input type="checkbox"/>	01/24/2013	ENG100-2013-00139	Engineering - Erosion Control			Open	

< Prev 1 2 3 Next >

If the search returns more than 10 Permits the pages will be listed below. The maximum number of Permits that can be returned is 100.

A Permit can be selected by clicking on the Permit number of the desired Permit.



City of Madison Engineering Division
210 Martin Luther King, Jr. Blvd. City-County Building Suite 115 Madison WI 53703

Permit to Abandon Sanitary and/or Storm Sewer Lateral

Permit No. ENGSRP-2023-03983

This permit is issued to the Owner/Representative of Owner, of the property located at the address shown below to abandon the private sanitary and/or storm sewer lateral(s) that served this property. The Owner/Representative of Owner agrees to perform all work in accordance with Sections 29.13(5) and 37.05(7) of the Madison General Ordinances and is subject to the following conditions:

1. The Owner/Representative of Owner shall excavate, expose and plug the existing sanitary and/or storm lateral(s) on the above property at the point where it enters public right-of-way or easements.
2. The Owner/Representative of Owner shall **notify City Engineering Construction Inspector at least 24 hours in advance** and shall allow entry on the property to inspect the sewer plug.
3. The Owner/Representative of Owner shall backfill the excavation with supervision of the City Engineer to insure no damage is done to the lateral plug by the backfill operation.
4. All conditions of the permit must be adhered to and the disconnection or abandonment must be successfully inspected by the City Inspector in order for the Owner/Representative of Owner to obtain any refund of the deposit.
5. The Owner/Representative of Owner shall assume all responsibility for any damage done to persons or property which may result due to the abandoning of the lateral(s).
6. The Owner/Representative of Owner shall satisfactorily comply with the above conditions within 60 days after the date on this form unless the time is extended in writing by the City Engineer.

SCHEDULE INSPECTION AT LEAST 24 HOURS IN ADVANCE

Contact: Adam Vanden Heuvel, Construction Inspector 2 Office: 266-4514
avandenheuvel@cityofmadison.com

Cell Phone: (608)520-2513 E-mail:

Permit Issued To:

Jim Whitney

Property Address:

808 Hughes PL

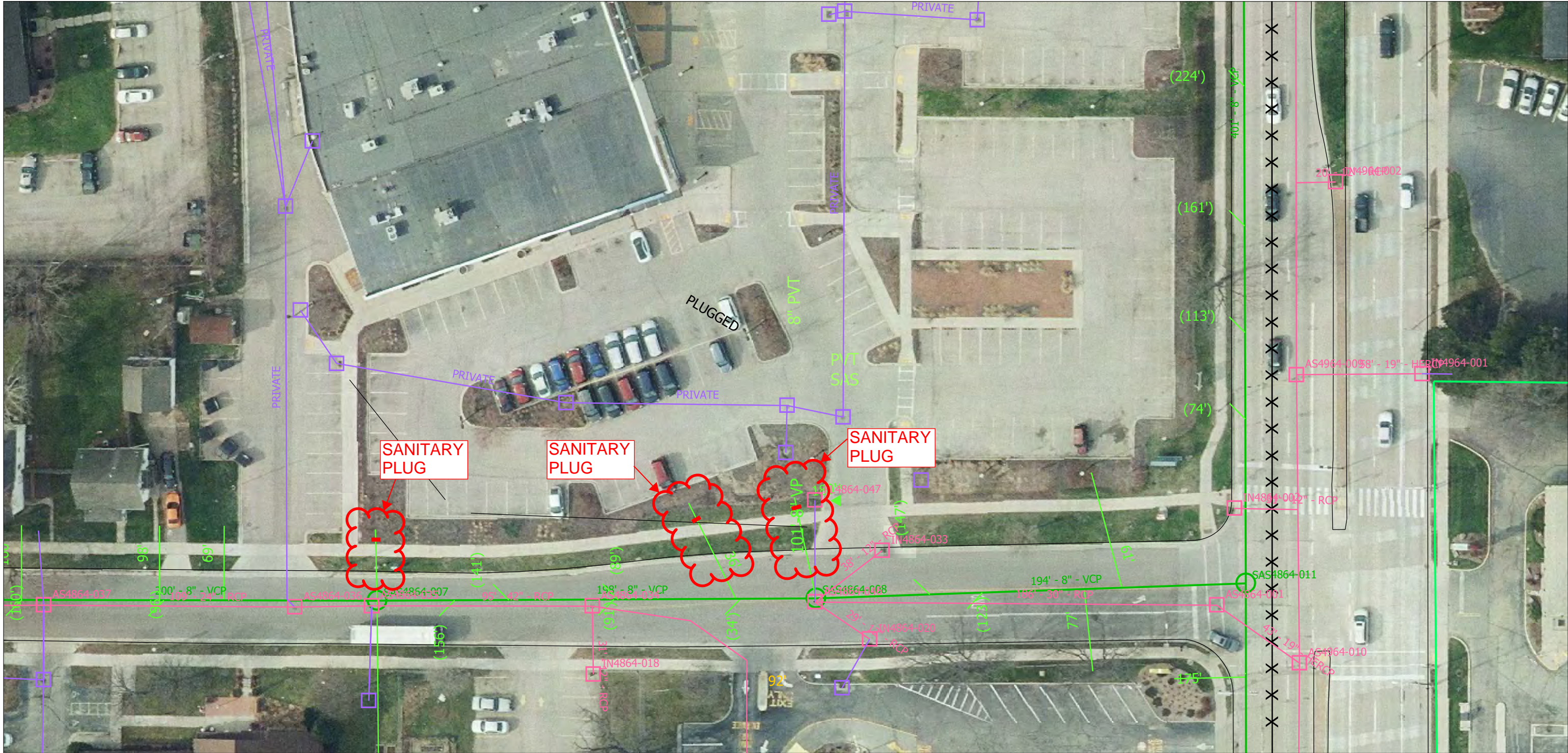
AUTHORIZED BY:

Robert F. Phillips, P.E. City Engineer

ISSUE DATE: 05/12/2023

EXPIRATION DATE: 05/12/2024

NUMBER OF LATERALS TO BE ABANDONED	SANITARY	Permanent: <u>3</u>	STORM	Permanent: <u>0</u>
		Temporary: <u>0</u>		Temporary: <u>0</u>



Time: 5/3/2023 9:38:29 AM

Session: C:\Users\enjcw\Downloads\ villager GT Viewer.gts

City of Madison, WI - GIS/Mapping data

Printed By: enjcw

Disclaimer: The City makes no representation about the accuracy of these records and shall not be liable for any damages



City of Madison Engineering Division

210 Martin Luther King, Jr. Blvd. City-County Building Suite 115 Madison WI 53703

Permit to Abandon Sanitary and/or Storm Sewer Lateral

Permit No. **ENGSRP-2023-03984**

This permit is issued to the Owner/Representative of Owner, of the property located at the address shown below to abandon the private sanitary and/or storm sewer lateral(s) that served this property. The Owner/Representative of Owner agrees to perform all work in accordance with Sections 29.13(5) and 37.05(7) of the Madison General Ordinances and is subject to the following conditions:

1. The Owner/Representative of Owner shall excavate, expose and plug the existing sanitary and/or storm lateral(s) on the above property at the point where it enters public right-of-way or easements.
2. The Owner/Representative of Owner shall **notify City Engineering Construction Inspector at least 24 hours in advance** and shall allow entry on the property to inspect the sewer plug.
3. The Owner/Representative of Owner shall backfill the excavation with supervision of the City Engineer to insure no damage is done to the lateral plug by the backfill operation.
4. All conditions of the permit must be adhered to and the disconnection or abandonment must be successfully inspected by the City Inspector in order for the Owner/Representative of Owner to obtain any refund of the deposit.
5. The Owner/Representative of Owner shall assume all responsibility for any damage done to persons or property which may result due to the abandoning of the lateral(s).
6. The Owner/Representative of Owner shall satisfactorily comply with the above conditions within 60 days after the date on this form unless the time is extended in writing by the City Engineer.

SCHEDULE INSPECTION AT LEAST 24 HOURS IN ADVANCE

Contact: Adam Vanden Heuvel, Construction Inspector 2 Office: 266-4514
avandenheuvel@cityofmadison.com

Cell Phone: (608)520-2513 E-mail:

Permit Issued To:

Jim Whitney

Property Address:

808 Hughes PL

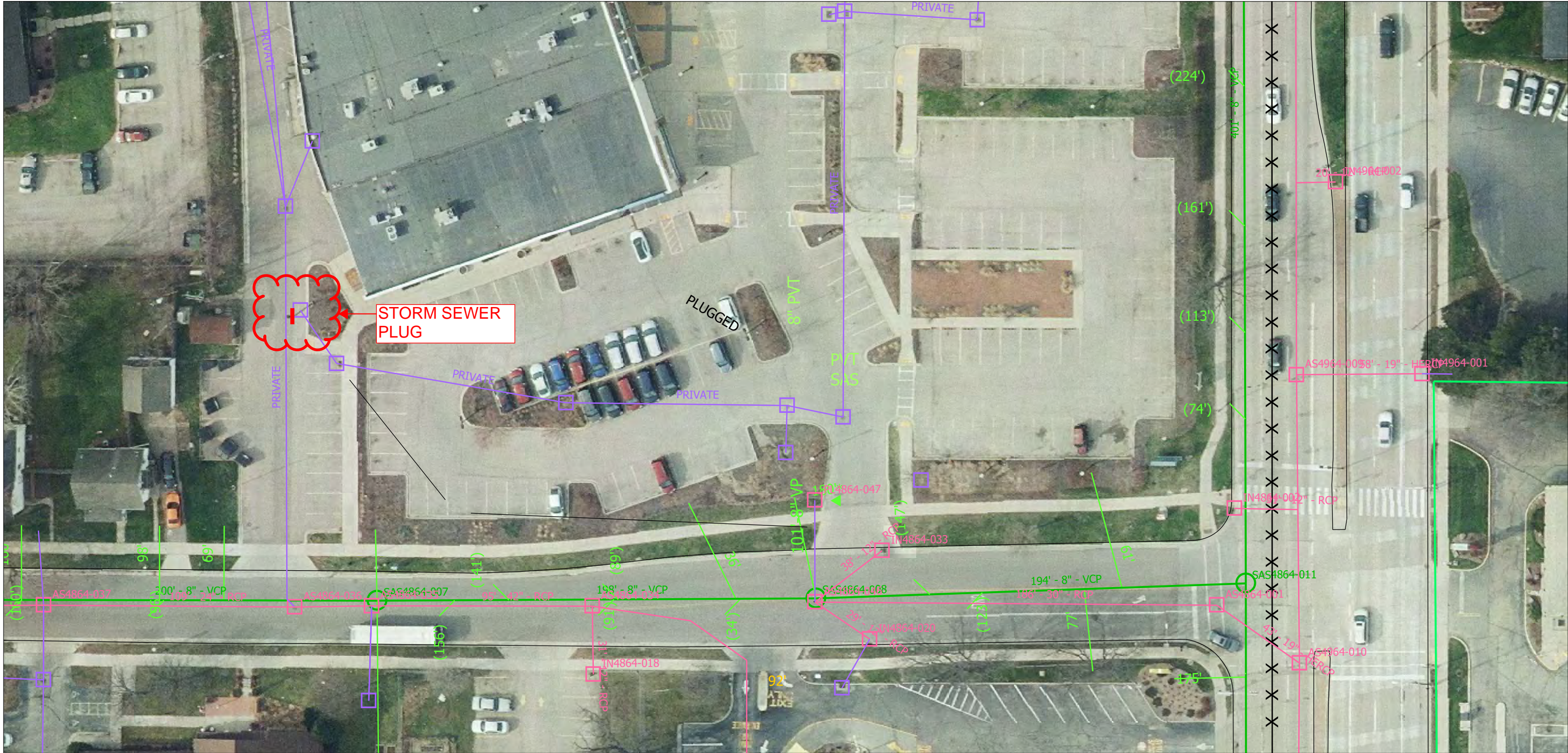
AUTHORIZED BY:

Robert F. Phillips, P.E. City Engineer

ISSUE DATE: 05/12/2023

EXPIRATION DATE: 05/12/2024

NUMBER OF LATERALS TO BE ABANDONED	SANITARY	Permanent: <u>0</u>	STORM	Permanent: <u>0</u>
		Temporary: <u>0</u>		Temporary: <u>1</u>



Time: 5/3/2023 9:38:29 AM

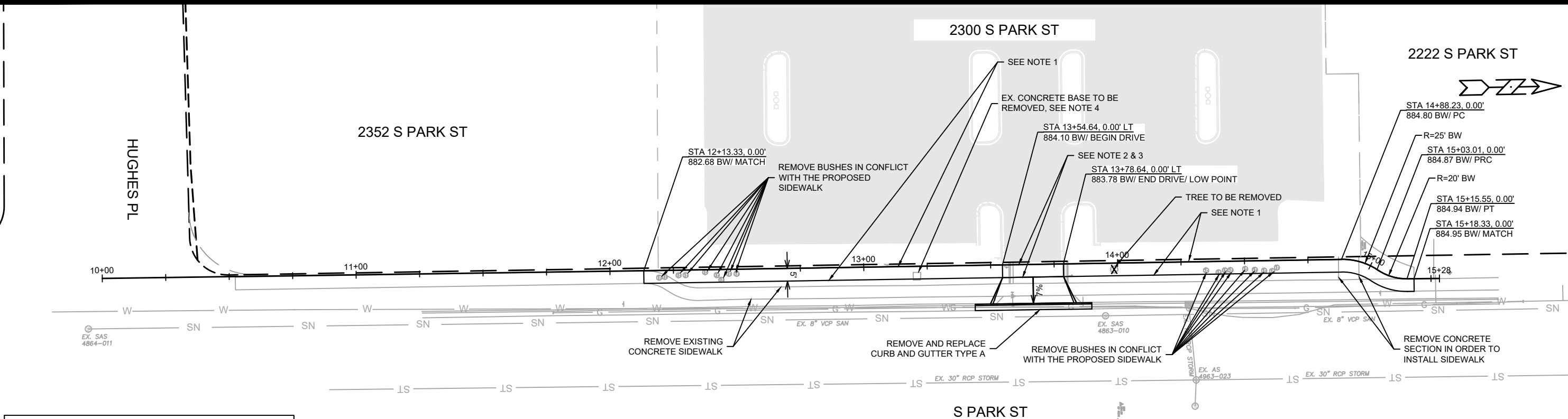
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City of Madison, WI - GIS/Mapping data

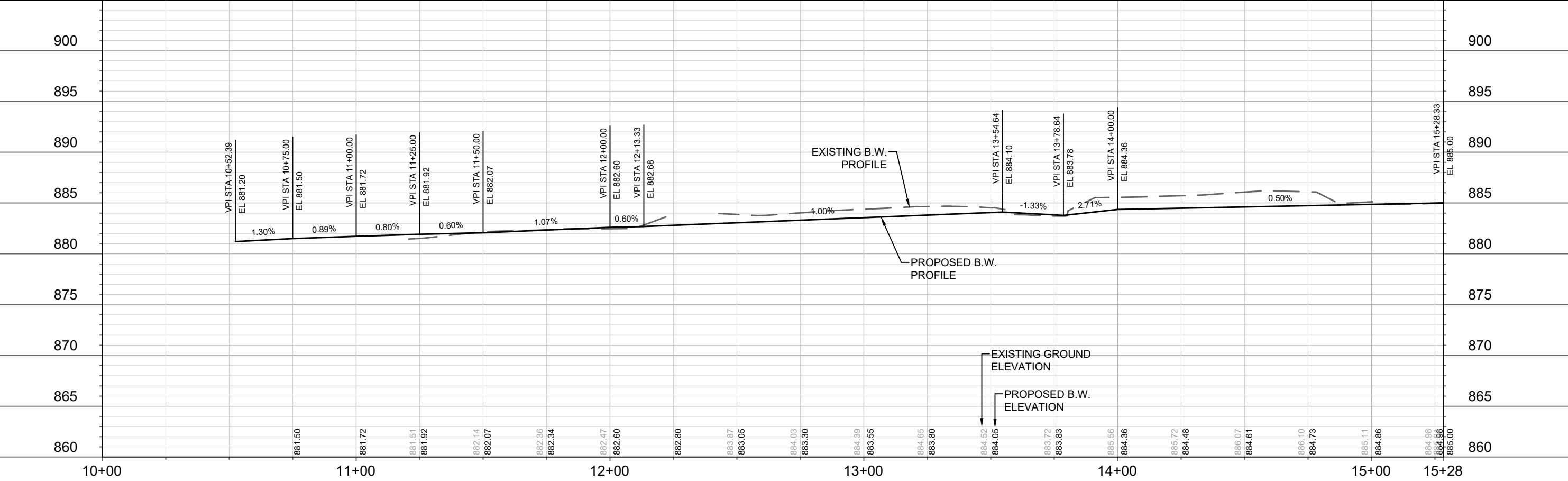
Printed By: enjcw

Disclaimer: The City makes no representation about the accuracy of these records and shall not be liable for any damages

D-1



- NOTES
- 5" CONCRETE SIDEWALK
 - 7" CONCRETE SIDEWALK & DRIVE APRON
 - SEE COMMERCIAL DRIVEWAY PERMIT LNDUSE- 2022-00112
 - THERE MIGHT BE ELECTRICAL CONDUIT CONNECTED TO THE EX. CONCRETE BASE. THE CONTRACTOR SHALL FIELD VERIFY THE EXISTENCE OF THE ELECTRICAL CONDUIT PRIOR TO THE BASE REMOVAL. IF THE CONNECTION IS CONFIRMED, THE CONTRACTOR SHALL REMOVE THE ELECTRICAL CONDUIT PER CODE.



DATE	BY	REVISION	DATE	BY
6/13/2023	10:19 AM	###	###	###

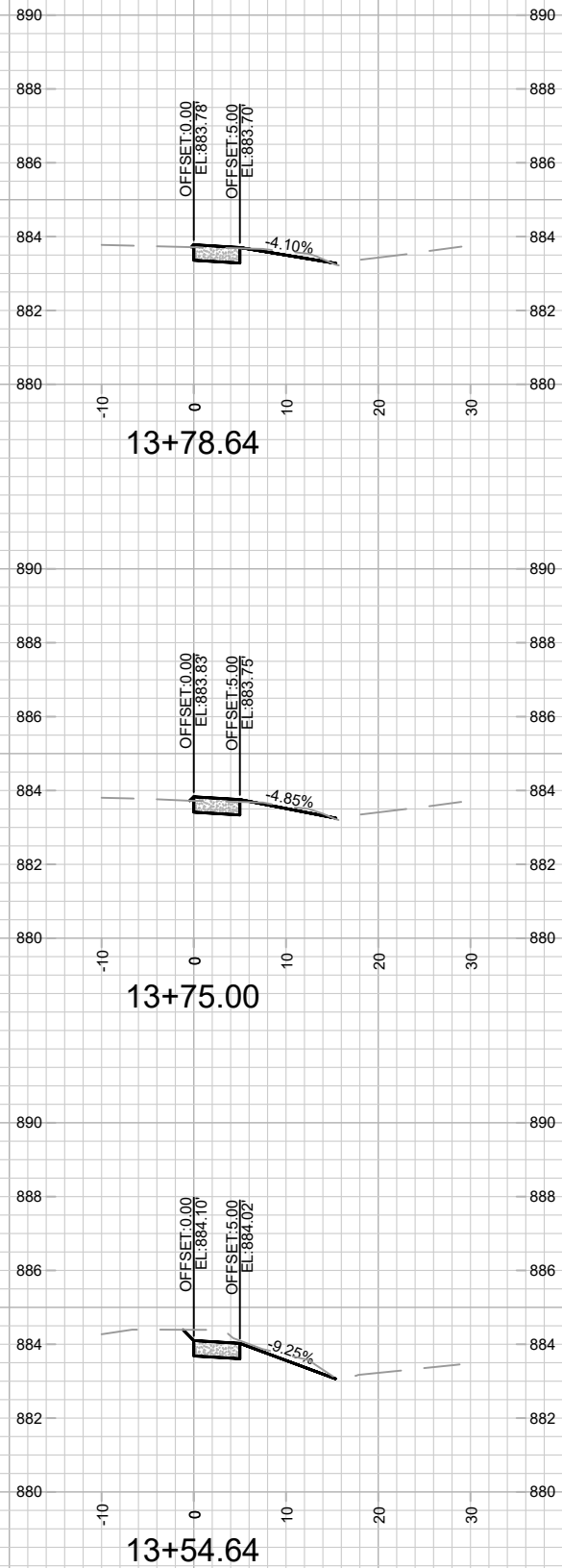
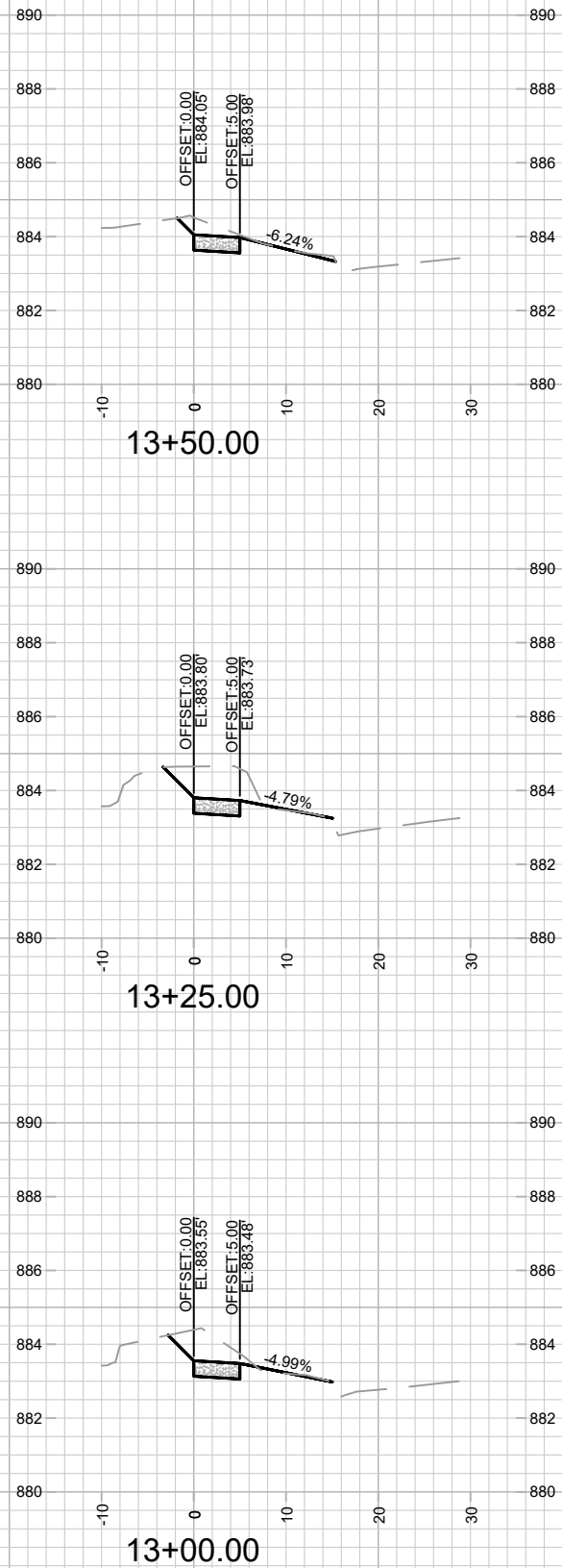
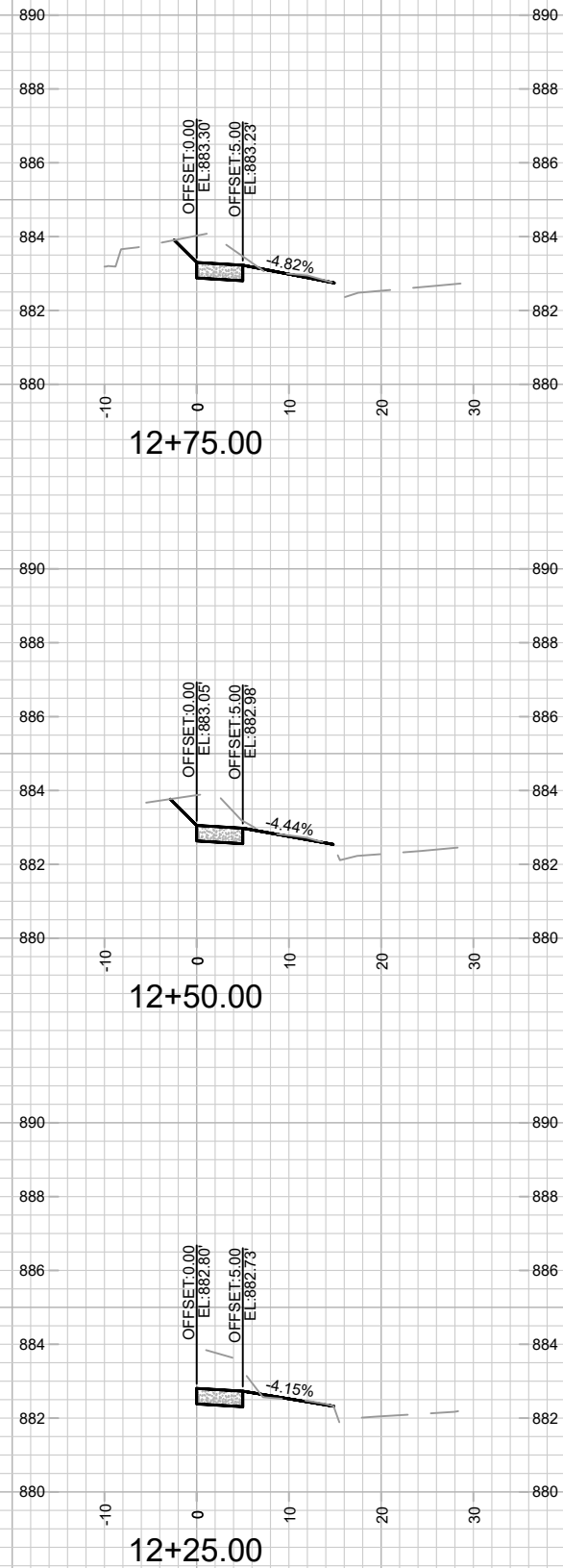
Scale: ###

Designed By: ###

Checked By: ###

Drawn By: ###

City of Madison
VILLAGE ON PARK PARKING STRUCTURE AND SITE IMPROVEMENTS
MADISON, WI
CONTRACT NO. 2022-00112
SHEET P-1

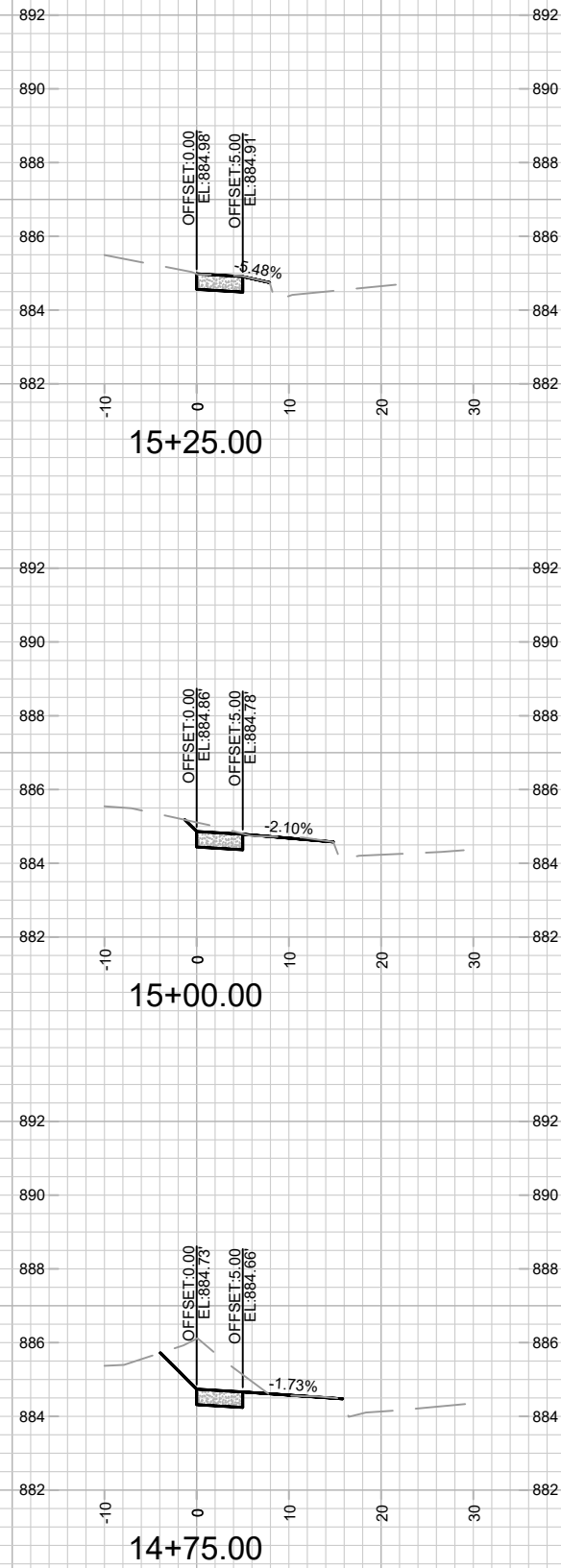


X-1

CROSS SECTIONS - S PARK STREET
VILLAGE ON PARK PARKING STRUCTURE AND SITE IMPROVEMENTS

MADISON, WI
CONTRACT NO. 2022-001
DESIGNX SHEETS

MARK	REVISION	DATE	BY
####	####	####	####
Designed By: ###	Scale: ####	Date: 6/12/2023 4:41 PM	Scale: ####



Notes:

1) All contractors and subcontractors performing work in the public right-of-way are required to be prequalified with the City of Madison. Prequalification forms are available on the City's website at:

<https://www.cityofmadison.com/engineering/developers-contractors/contractors/how-to-get-prequalified>

2) The contractor is required to obtain a city permit to excavate in the public right of way.

APPLICATION TO EXCAVATE IN PUBLIC RIGHT-OF-WAY SUBMITTAL CHECKLIST

ATTACHMENT NO. 12
4-pages

Submittal Includes:

- ☐ Back of curb, right-of-way, property lines, and all existing utilities displayed on site plan(s). Exceptions to this requirement can be made for the following circumstances when only affecting one property:

- Service shut-off
- Anode installation
- Service installation/replacement (where the installation is generally perpendicular to road centerline)
- Pole installation/replacement
- Valve or hydrant repair/replacement (in terrace)

The City of Madison Engineering Dept. posts utility data online for viewing through a web-based program called GTWeb. To register, please contact:
gtweb@cityofmadison.com

- ☐ Dimensions provided between proposed utility placement and back of curb or right-of-way/property lines. If dimensions are provided off of right-of-way or property lines, these boundaries must be established in the field for inspection purposes.

- ☐ Anticipated location of bore pits and excavations shown along with the traffic control associated with each.

If during construction a bore pit or excavation location is adjusted to the extent that it requires a different traffic control configuration, the applicant will contact the City with the revisions.

- ☐ Traffic Control Plan, including pedestrian & bicycle designs as well as any temporary measures for potholing where applicable. Traffic Control Plans are not needed under the following circumstances, which must be indicated on applications:

- Work performed solely on streets designated as "Local." The City may require a full traffic control plan where the applicant has demonstrated a lack of compliance in the past.
- Work performed within the limits of active Public Works projects.
- Work performed within the limits of new plat developments where streets and sidewalks remain closed to public access for the duration of the work.

Customized Traffic Control Plans per MUTCD may be needed for projects at intersections or projects that are generally complex in nature. For all other circumstances, submissions may be able to reference individual pages from the Work Zone Safety Handbook that correlate with site conditions: <https://wisconsin.gov/Documents/doing-bus/real-estate/permits/wzsb.pdf>.

If applicants have worked with a staff member from Traffic Engineering to develop a Traffic Control Plan, please provide that information and the name of the staff member in the description of work.

Any street parking removed for installation will be restricted to 3 weeks at a time.

A request for permission to close a road must be included on the permit. If it becomes necessary to close a road during construction not indicated for closure on the permit, the contractor must contact the City and obtain permission.

- ☐ All contractors and subcontractors performing work listed on application. All contractors & subcontractors must be pre-qualified with the City of Madison
 - All contractors and subcontractors must be listed prior to the permit being issued. If any changes to the list are necessary, the applicant must contact the City in order to have the updated list and permit approved.
- ☐ Copy of notification letter mailed to property owners and list of property owners notified for projects extending more than one block in residential or commercial areas.
 - ☐ N/A (project is less than 1 block in length)
- ☐ Site Plans shall be stamped with a notice that requires the owner and/or contractor to contact the City Forestry Section at (608) 266-4816 prior to the start of any on-site construction that may have a street tree-related impact.
 - If applicants have worked with a staff member from City Forestry, please provide that information and the name of the staff member in the description of the work.
- ☐ Identify existing street trees on site plan(s) where root cutting for Curb & Gutter or Sidewalk Repair installation will occur.
- ☐ Applicant shall identify on proposed work zone and any traffic control plan submittals the location of posted curbside bus stop no parking zones and accessible bus passenger boarding pad surfaces/sidewalk connections.
- ☐ Applicant shall contact Metro Transit (metronotice@cityofmadison.com) at least five working days before any proposed work that may impact curbside bus stop zones or scheduled bus operations on City streets, to start any coordination steps that would be required to maintain scheduled City transit operations.

APPLICATIONS THAT DO NOT MEET THESE CRITERIA WILL BE REJECTED.

Clearance requirements for design of proposed utility installations:

	<u>Horizontal Clearance (ft)</u>	<u>Vertical Clearance (ft)</u>
Back of Curb	6	-
Sanitary Sewer (mains, laterals and structures)	3	1
Storm Sewer (mains, laterals, and structures)	3	1
Traffic Engineering (conduit and structures)	3	1
Water Utility (mains, valves, services, and hydrants)	4	2



CITY OF MADISON, WISCONSIN
**APPLICATION TO EXCAVATE IN PUBLIC RIGHT-OF-WAY
CONNECT TO CITY SANITARY AND/OR STORM SEWER**

I. APPLICANT INFORMATION

Company _____ Date of Application _____
Contact _____ Address _____
Telephone _____
E-mail _____ Customer Reference # (optional) _____

II. CONTRACTOR INFORMATION

City Prequalified Contractor to Perform Work _____
Contact _____ Telephone _____

III. PROPOSED WORK

A. SCHEDULE Estimated Start Date _____ Estimated Completion Date _____

B. LOCATION OF PROPOSED WORK

ADDRESS (Note: Please enter a single, valid City of Madison address; i.e., 1600 Emil St.)

Number	Direction	Street Name	Type
--------	-----------	-------------	------

ADDITIONAL INFORMATION DESCRIBING LOCATION LIMITS (i.e., Work to occur in 1400 through 1600 blocks of Emil St.)

C. TYPE OF FACILITY (Check all boxes that apply)

<input type="checkbox"/> Water	<input type="checkbox"/> Hydrant	<input type="checkbox"/> Lead Pipe	(If in conjunction with Water Utility work indicate Permit #_____)	<input type="checkbox"/> Main		
<input type="checkbox"/> Sanitary	<input type="checkbox"/> Storm	<input type="checkbox"/> Gas	<input type="checkbox"/> Electric	<input type="checkbox"/> Telecommunications	<input type="checkbox"/> Cable	<input type="checkbox"/> Service
<input type="checkbox"/> Other: _____						<input type="checkbox"/> N/A

D. PURPOSE

☐ Install ☐ Repair ☐ Replace ☐ Cut Off ☐ Other: _____

E. LOCATION

☐ Travel Lane ☐ Parking Lane ☐ Terrace ☐ Sidewalk ☐ Easement/Greenway
☐ Other: _____

F. TRENCH TYPE AND SIZE

☐ Asphalt (Show total asphalt dimensions here or on accompanying sketch) _____
The pavement rating may be found on the City Engineering web page
at <http://gis.ci.madison.wi.us/MADMAPS/GISHome.html> under the
heading "Pavement"
☐ Non-Asphalt (Show total non-asphalt dimensions here or on accompanying sketch) _____
☐ Concrete ☐ Sod ☐ Other _____

G. BORING

Will this work involve boring? ☐ YES ☐ NO If you responded YES, enter total bore length: _____ LF

NOTICE: Sanitary and storm utility locate marks provide the approximate horizontal location of existing facilities. Please indicate below the method you will use to field verify the actual horizontal and vertical location of existing sanitary/storm utilities prior to boring.

☐ Potholing at every sanitary and storm sewer facility in boring path.

☐ Pre-boring CCTV inspection and locating with sonde to provide accurate horizontal and location of existing sanitary and facilities and post-boring CCTV inspection to verify that no such facilities were damaged during the boring process.

- Continued on Reverse -

IV. CONNECTION TO CITY SANITARY AND/OR STORM WATER SYSTEM

<input type="checkbox"/>	Connection to City Sanitary for	<input type="checkbox"/> NEW	OR	<input type="checkbox"/> EXISTING building/facility		
	Number of Connections			Pipe Material		Diameter
<input type="checkbox"/>	Connection to City Storm for	<input type="checkbox"/> NEW	OR	<input type="checkbox"/> EXISTING building/facility		
	Number of Connections			Pipe Material		Diameter

V. Will a permanent structure be placed in the public right-of-way by other than a utility? ☐ Yes ☐ No
Note: If you respond YES to above, a copy of Encroachment Agreement must be attached in order for this application to be processed.

VI. Sketch showing existing utilities in relation to proposed work is attached. ☐ Yes ☐ No
Note: Applications without a sketch cannot be processed.

In consideration of being permitted to make such excavation, the permittee hereby agrees that it will faithfully comply with the terms of the permit as issued by the City of Madison including any Special Provisions; that it will comply with all applicable statutes, ordinances, rules and regulations of the State of Wisconsin and the City of Madison; that it shall require its contractor(s) to become qualified by the City of Madison prior to starting work on this permit; that it will indemnify, defend and hold the City of Madison harmless from any and all claims, liability, loss, damage or expense incurred by the City of Madison on account of any injury or death of any person or any damage to property caused by or resulting from activity or work performed under this permit, whether caused by or contributed to by the City of Madison, its officials, its agents or employees, and that it hereby agrees to purchase comprehensive public liability insurance showing the City of Madison as an additional insured and shall provide thirty (30) days written notice to the City upon cancellation or material change in the policy with renewal certificates provided to the City for three (3) years from the date of completion of work hereunder; that it will at all times keep the place where such excavation is made properly guarded by day and lighted by night; that it will leave the street, sidewalk, alley, or terrace in as good or better condition than existed when the work was commenced; that it will have all finished concrete and asphalt work within the right-of-way performed by a licensed concrete layer or licensed asphalt paver, as the case may be; that all restoration of the street, sidewalk, alley or terrace affected by acting upon this permit shall be completed within twenty (20) calendar days of the closing of the excavation; the permittee shall guarantee their work and shall maintain it for thirty-six (36) months following the date of completion; that if this project requires a detour, it will provide the Traffic Engineer seventy-two hours notice prior to commencement of; that it agrees this permit may be voided by the City Engineer if the work is not started within a reasonable length of time after the above stated starting date; and that it will comply with Chapter 37 of the Madison General Ordinances, Erosion and Stormwater Runoff Control.

Furthermore, the permittee agrees to provide the City of Madison minimum notice as follows: (1) Forty-eight (48) hours prior to starting work and upon completion of work the permittee shall notify City Engineering at (608) 266-4514 and Traffic Engineering at (608) 266-4761; (2) Twenty-four (24) hours prior to placement of steel plates the permittee shall notify the Streets Department East at (608) 246-4532 or Streets Department West at (608) 266-4681; and (3) Forty-eight (48) hours prior to connecting to the City's sanitary sewer and/or storm water systems the permittee shall notify the City's Utility Inspector or (608) 266-4514. Please note that failure to provide adequate notice will result in re-excavating the trench at your own cost so that the City can inspect the work performed.

Date of Application _____

Signature of Permittee Representative _____

Please Print Name and Title of Permittee Representative _____

QUESTIONS? Please contact the following City staff if you need assistance completing this application.

INSPECTION	Adam Vandenheuvel, City Engineering	(608) 266-4514
TECHNICAL		
STREETS	Reid Stiteley, City Engineering	(608) 266-4093
SEWERS	Elia Acosta, City Engineering	(608) 266-4096
TRAFFIC CONTROL	Jon Kollman, City Traffic Engineering	(608) 266-6526
TRAFFIC CONTROL	Scott Kerr, City Traffic Engineering	(608) 266-6536
WATER	Jonathan Geiger, Water Utility	(608) 261-9832
GENERAL	Cindy Hemenway, City Engineering	(608) 266-6429

Submit completed applications to:

Mail or drop off: City of Madison Engineering Division - Permit Applications, 1600 Emil Street, Madison, WI 53713

Via email: rowpermits@cityofmadison.com



PLAN EXAMINATION LETTER

ATTACHMENT NO. 13
1-page

PROJECT #: **BLDNCC-2023-06549 and
BLDNCH-2023-06550**

Building Inspection Division
215 Martin Luther King Jr. Blvd. Ste. 017
Madison, Wisconsin 53703
608 266-4551

Date: July 17, 2023

DAN WINDORSKI
GRAEF
110 E WASHINGTON AVE #202
MADISON WI 53703

RE: Occupancy: Storage Group S2 – open parking garage
Owner: Community Development Authority of City of
Madison
Supervising Professionals: Dan F. Windorski, building;
Jessica Culver, HVAC
Square Feet: 120,700

Parking Structure

Project Location
808 HUGHES PLACE

These plans have been reviewed for compliance with the important code requirements in Chapters SPS 361 through 366 of the Wisconsin Administrative Code.

The **NEW BUILDING AND HVAC** plans are **CONDITIONALLY APPROVED**.

The plans have been reviewed for compliance with the code requirements set forth in Chapters SPS 361-366 of the rules of the Department of Safety and Professional Services. Construction may proceed subject to local regulations, but all items that are required to be changed by this letter must be corrected before commencing that part of the work. This plan has not been reviewed for compliance with Chapters SPS 382-386, the plumbing rules of the Department of Safety and Professional Services. You are hereby advised that the owner as defined in Chapter 101.01(2)(e) of Wisconsin State Statutes is responsible for all code requirements not specifically cited herein. The building will be inspected during and after construction.

SPS 361.33 Evidence of Approval. The architect, professional engineer, designer, builder or owner shall keep, at the building, one set of plans bearing the stamp of approval.

THIS BUILDING HAS BEEN CLASSIFIED AS TYPE **IIB** CONSTRUCTION. ☒ Sprinklered

Inspectors: **Will Henry, building** Phone: (608)266-5910; **Jerry Noel, HVAC** Phone: (608)266-4520

Reviewed By: **Alan Harper, Plan Examiner** Phone: (608)266-4558 Supervisor: **Kyle Bunnow**
aharper@cityofmadison.com



PLAN EXAMINATION LETTER

ATTACHMENT NO. 14
1-page

PROJECT #: **BLDNCC-2023-07431**

Building Inspection Division
215 Martin Luther King Jr. Blvd. Ste. 017
Madison, Wisconsin 53703
608 266-4551

Date: June 28, 2023

DAN WINDORSKI
GRAEF
1010 E WASHINGTON AVE #202
MADISON WI 53703

RE: Occupancy: Mercantile Group M
Tenant: grocery store
Owner: Community Development Authority of City of
Madison
Supervising Professional: Daniel F. Windorski
Square Feet: 3,800

Grocery Store Alteration

Project Location
2328 S. PARK STREET

These plans have been reviewed for compliance with the important code requirements in Chapters SPS 361 through 366 of the Wisconsin Administrative Code.

The **BUILDING ALTERATION** plans are **CONDITIONALLY APPROVED**.

The plans have been reviewed for compliance with the code requirements set forth in Chapters SPS 361-366 of the rules of the Department of Safety and Professional Services. Construction may proceed subject to local regulations, but all items that are required to be changed by this letter must be corrected before commencing that part of the work. This plan has not been reviewed for compliance with Chapters SPS 382-386, the plumbing rules of the Department of Safety and Professional Services. You are hereby advised that the owner as defined in Chapter 101.01(2)(e) of Wisconsin State Statutes is responsible for all code requirements not specifically cited herein. The building will be inspected during and after construction.

SPS 361.33 Evidence of Approval. The architect, professional engineer, designer, builder or owner shall keep, at the building, one set of plans bearing the stamp of approval.

THIS BUILDING HAS BEEN CLASSIFIED AS TYPE **IIB** CONSTRUCTION. ☒ Sprinklered

This is a level **2** alteration.

CONDITIONS OF APPROVAL:

IBC 1010.1.5 Provide a landing outside the new exterior door. The landing shall be supported on a frost protected foundation as required by 1809.5.

Inspector: **Will Henry** Phone: (608)266-5910

Reviewed By: **Alan Harper, Plan Examiner** Phone: (608)266-4558
aharper@cityofmadison.com

Supervisor: **Kyle Bunnow**