PROJECT MANUAL

Capitol East Parking Garage

FOR

The City of Madison, Wisconsin

Issued for Final Bid
Construction Specifications
VOLUME I (Divisions 00 through 21)

GRAEF Project No. 2017-5051.00
Contract No. 7951
Munis No. 1627-82-140

June 30, 2017

ENGINEER/ARCHITECT

GRAEF

BWBR

KEN SAIKI DESIGN
LANDSCAPE ARCHITECTS

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SECTION 00 01 10

TABLE OF CONTENTS

VOLUME I (Divisions 00 – 21)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

TABLE OF CONTENTS (continued)

END OF SECTION

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SECTION 00 31 46
PERMITS

PART 1 – GENERAL

1.1. SUMMARY

A. Each project has varying requirements for permits, inspections, and fees based on the scope, size, and location of the project.

B. The City of Madison (Owner) is subject to all permits, inspections and associated fees for construction, demolition, utility connection, storm water management, and other similar requirements that may be required to complete the scope of work associated with these contract documents.

C. The General Contractor (GC) shall be responsible for obtaining all permits, inspections and paying for all associated fees unless specifically identified within this specification.

1.2. REFERENCES

A. The following references are not intended to be all inclusive. It shall be the GC's responsibility to determine all requirements based on the scope of work in the contract documents.

B. City of Madison Ordinances: Review all ordinances that may require a permit or fee that may be connected with a required permit. Contact the following City Agencies to determine the exact requirements during bidding
1. Building Inspection
2. Zoning
3. Engineering
4. Water Utility
5. Traffic Engineering
6. Others as may be specified by the contract documents.

B. State Statutes

C. Other Regulatory Regulations

D. Other Agencies or companies that may have related requirements
1. Madison Metropolitan Sewerage District
2. Local gas and electric utility companies
3. Other utility companies

1.3. GENERAL CONTRACTORS REQUIREMENTS

A. The GC shall be responsible for all of the following:
1. Execute application for all required permits as may be required by the scope of work described within the contract documents.
2. Paying all fees associated with the application of any required permits.
3. Scheduling all required inspections that may be conditions of any required permits.

B. The GC shall provide high quality scanned images of all required permits and inspections and upload them to the Contract Documents-Regulatory Documents Library on the Project Management Web Site.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

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SECTION 01 25 13
PRODUCT SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.1. SUMMARY

A. The City of Madison uses a specific list of preferred products for various specification items to establish standards of quality, utility, and appearance required.

B. The City of Madison will not allow substitutions for specified Products except as follows:
   1. The Product is no longer produced or the product manufacturer is no longer in business.
   2. The manufacturer has significantly changed performance data, product dimensions, or other such design criteria for the specified Product(s).
   3. Products specified by naming one or more Products or manufacturer's and "or approved equal" or "approved equivalent."

C. The City of Madison will not allow substitutions for specified Products as follows:
   1. For Products specified by naming only one Product and manufacturer, no substitute product will be considered.
   2. For Products specified by naming several Products or manufacturers select any one of the products or manufacturers named, which complies with the specifications. No substitute product will be considered.

D. Request for substitutions from any party other than the General Contractor (GC) will not be accepted.

1.2. RELATED SPECIFICATIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 31 23 Project Management Web Site
C. Section 01 33 23 Submittals

PART 2 – PRODUCTS

2.1. SUBSTITUTION REQUEST FORM

A. During bidding all contractors (General and Sub-contractors) and suppliers of materials or products shall provide hard copy of the Substitution Request form and all required attachments directly to the Project Architect. Submission shall use the form located at the end of this specification.
   1. Contractors and suppliers shall use the screen shot of the form located at the end of this specification to print a hard copy for all pre-bid substitution requests.

B. After bidding only the GC shall submit a request and shall use the form located on the Project Management Web Site.

PART 3 - EXECUTION

3.1. REQUESTING A SUBSTITUTION DURING BIDDING

A. In the event that a substitution is requested during the bidding phase the Contractor or Supplier shall meet the substitution request deadline listed in the bidding documents. No substitution request will be considered during the bidding period after the stated substitution request deadline. In general this procedure shall be as follows:
   1. Submit the Substitution Request Form including all required supporting documentation to the City Project Manager and Project Architect by the substitution request deadline specified in Section A of the Contract Documents. Utilize the Substitution Request Form found at the end of this Section.
   2. Submit a Substitution Request Form for each product, supported with complete data, drawings and samples as appropriate, including:

i. Comparison of qualities of the proposed substitutions with that specified.
ii. Changes required in other elements of the Work because of the substitution.
iii. Effect on the construction schedule.
iv. Cost data comparing the proposed substitution with the Product specified.
v. Any required license fees or royalties.
vi. Availability of maintenance service and source of replacement materials.

3. The Owner and Architect will review the Substitution Request Form and if approved the City of Madison will publish a bidding addendum authorizing the replacement. The Owner and Architect may reject any substitution request without providing specific reasons.

B. Substitutions submitted and approved during the bidding phase shall be announced by the City of Madison by addenda prior to the bid due date.

3.2. REQUESTING A SUBSTITUTION AFTER AWARD OF CONTRACT

A. A substitution request will only be considered after award of contract if it meets the qualifying provisions as described in 1.1.B.1 and .2 above.

B. The GC shall submit a substitution request using the digital form on the Project Management Web Site located in the Construction Administration-Substitution Request library.

1. Click on *Add document* to open a new digital form, fill out form, provide required attachments, then click the Submit button.
2. Consulting Staff, Owner and Owners Representatives will review the request and provide the appropriate approvals and feed back to the GC.

3.3. UNAUTHORIZED SUBSTITUTIONS

A. Any Contractor who substitutes products without proper authorization by the Owner and Architect will be required to immediately remove and replace the product and all costs required to conform to the Contract Documents shall be borne by the General Prime Contractor.

END OF SECTION

Substitution Request

Today's Date: 1/27/2015

Project Title:

Project Number: Contract Number:

Description	Spec Section	Page	Paragraph

The undersigned requests consideration of the following:

Proposed Substitution:

Attachments

Click here to attach a file

Insert item

- Attached data includes product description, specifications, drawings, photographs, performance and test data adequate for evaluation of the request; applicable portions of the data are clearly identified.
- Attached data also includes a description of changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned General Contractor representative certifies that the following paragraphs are correct.

1. ***The function, appearance, and quality of the proposed substitution are equal or superior to the specified item.***
2. ***The proposed substitution does not affect dimensions shown on drawings.***
3. ***The undersigned will pay for changes to the building design, including engineering design, detailing, and construction costs caused by the request.***
4. ***The proposed substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.***
5. ***Maintenance and service parts will be locally available for the proposed substitution. Provide supporting documentation.***

Submitted By:

****By typing my name and entering the date I hereby give my electronic signature****

Name: Title: Date:

Firm: Address:

Phone:

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SECTION 01 26 13
REQUEST FOR INFORMATION (RFI)

PART 1 – GENERAL

1.1. SUMMARY

A. Contractors shall use the RFI form/process to request additional information or clarification regarding the construction documents.

B. All RFI documentation will be processed through the through the Construction Administration-Request for Information Library on the Project Management Web Site (PMWS).

1.2. RELATED SPECIFICATIONS

A.	Section 01 26 46	Construction Bulletin (CB)
B.	Section 01 26 57	Change Order Request (COR)
C.	Section 01 26 63	Change Order (CO)
D.	Section 01 31 23	Project Management Web Site (PMWS)
E.	Section 01 91 00	Commissioning

1.3. PERFORMANCE REQUIREMENTS

A. RFI issues initiated by any contractor shall be done through the General Contractor (GC).
   1. RFIs submitted by any Sub-contractor under the GCs control shall be returned with no response.

B. Submit a new RFI for each issue. Only multiple questions that are of a similar nature may be combined into one RFI shall be allowed and responded to.

1.4. QUALITY ASSURANCE

A. The GC shall be responsible for all of the following:
   1. Ensure that any request for additional information is valid and the information being requested is not addressed in the construction documents.
   2. Ensure that all requests are clearly stated and the RFI form is completely filled out.
   3. Ensure that all Work associated an RFI response is carried out as intended.

B. The PA shall be responsible for the following:
   1. Ensure that all responses to contractor initiated RFIs are properly responded to in a timely fashion.
      a. The CPM, Owner, consulting staff, and other City staff shall be responsible for the initial review of the RFI. The PA shall be responsible for codifying all consultant and Owner/City staff comments into a unified RFI response.

PART 2 – PRODUCTS

2.1. REQUEST FOR INFORMATION FORM

A. The RFI form is located on the Project Management Web Site. The GC, PA, or CPM as appropriate shall click the link in the left margin of the project web site opening a new form. Project information is pre-loaded, provide additional information as indicated below in the execution to complete the form.

PART 3 - EXECUTION

3.1. CONTRACTOR INITIATED RFI

A. Immediately on discovery of the need for additional information or interpretation of the Contract Documents any contractor may initiate an RFI for additional information or clarification through the GC.

B. The GC shall select the "Submit an RFI" link on the Project Management Web Site and completely fill out the form as follows:

1. Contract related information will be automatically populated on the form.
2. Thoroughly explain the issue at hand, provide backup information (photographs, sketches, drawings, data, etc) as necessary, and clearly state the question or problem that requires a resolution. Combine like or related issues but do not include multiple issues on one form.
    a. Example. If a duct interferes with other critical piping and electrical work include all issues into one RFI.
    b. Example. If you have a question regarding the chiller and another regarding toilet partitions create separate RFIs.
3. Check all relevant boxes for trades affected. This will assist the design team in determining who should be reviewing the RFI.

C. Upon completing the RFI click the "Submit" button. The PMWS software will automatically route the RFI to the appropriate reviewers.

3.3. RFI RESPONSES

A. Responses to simple RFI issues shall use the response section of the RFI form and shall be completed within five (5) working days of the RFI form being submitted.

B. Responses to more complex issues may require additional time or may require a Construction Bulletin to be published. The initial RFI shall be responded to within five (5) working days stating that the RFI is being reviewed and provide an estimated date for the response.

C. The following GC generated RFIs will be returned without action:

1. Requests for approval of submittals
2. Requests for approval of substitutions
3. Requests for approval of Contractor's means and methods.
4. Requests for coordination information already indicated in the Contract Documents.
5. Requests for adjustments in the Contract Time or the Contract Sum.
6. Requests for interpretation of A/E's actions on submittals.
7. Incomplete RFI or inaccurately prepared RFI.

3.4. COMMENCEMENT OF WORK RELATED TO AN RFI

A. The GC shall only proceed with the Work of an RFI when additional information is not required.

B. The GC shall not proceed with any Work associated with an RFI while it is under review.

C. The GC shall not proceed with any Work associated with an RFI that clearly states a CB will be issued in response to the RFI.

D. The GC will be required to immediately remove and replace unauthorized Work and all costs required to conform to the Contract Documents shall be borne by the GC.

END OF SECTION

SECTION 01 26 46
CONSTRUCTION BULLETIN (CB)

PART 1 – GENERAL

1.1. SUMMARY

A. Construction Bulletins (CB) are formal published construction documents that modify the original contract bid documents after construction has commenced. CBs may be published for many reasons, including but not limited to the following:
   1. Clarification of existing construction documents including specifications, plans, and details
   2. Change in product or equipment
   3. A response to a Request for Information
   4. Change in scope of the contract as either an add or a deduct of work

B. CBs provide a higher degree of detail in response to a Request for Information (RFI) through directives, REVISED JUNE 02, 2017 plans/details, and specifications as necessary.

C. The CB may change the original contract documents through additions or deletions to the Work.

D. Where the directives of a CB are significant enough to warrant a Change Order Request (COR) the GC shall use all information provided in the CB to assemble all required back-up documentation for additions and deletions of materials, labor and other related contract costs for the COR.

E. All CB documentation will be processed through the Construction Administration-Construction Bulletin Library on the Project Management Web Site (PMWS).

1.2. RELATED SPECIFICATIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 26 57 Change Order Request (COR)
C. Section 01 26 63 Change Order (CO)
D. Section 01 31 23 Project Management Web Site
E. Section 01 91 00 Commissioning

1.3. PERFORMANCE REQUIREMENTS

A. Project Architect (PA): The PA shall be the only person authorized to publish a CB as needed for any reason indicated in section 1.1.A above. The PA shall consult as necessary with any of the following while drafting the CB and shall confirm final direction with the CPM prior to issuing a CB:
   1. City Project manager (CPM)
   2. Owner
   3. Members of the consulting staff
   4. Members of city staff
   5. The General Contractor
   6. Sub-contractors
   7. Commissioning Agent (CxA)

B. General Contractor: The GC shall be responsible for the following as needed:
   1. Executing the directives of the CB when he/she believes that no changes in labor, materials, equipment, or contract duration will be required for additions or deletions.
   2. Submit a COR when he/she believes that a change in labor, materials, equipment or contract duration will be required for additions or deletions.

1.4. QUALITY ASSURANCE

A. The PA shall be responsible for ensuring the final CB sufficiently provides direction, details, specifications and other information as necessary for the GC to perform the intended Work.

B. The PA shall be responsible for ensuring the final CB is published as expeditiously as practical based on the complexity of the CB being written. CBs that may affect the GC critical path shall be given priority.

PART 2 – PRODUCTS

2.1. CONSTRUCTION BULLETIN FORM

A. The CB form is located on the Project Management Web Site. The PA shall click the link in the left margin of the project web site opening a new form. Project information is pre-loaded, the PA only needs to enter information and make attachments as needed to complete the form.

PART 3 - EXECUTION

3.1. WRITING THE CONSTRUCTION BULLETIN

A. The PA shall draft a CB as needed using the Construction Bulletin form on the Project Management Web Site.

1. The PA and/or consulting staff as necessary shall provide specifications, model numbers and performance data, details and other such information necessary to clearly state the intentions of the CB.
2. The consulting staff, CPM, Owner, CxA and other City Staff shall review the draft and recommend changes as needed.
3. The PA shall amend the draft as necessary into a final CB for review

B. Once the final CB has been approved the PA shall “Submit” the CB through the Project Management Web Site to the GC.

3.2. EXECUTING THE CONSTRUCTION BULLETIN

A. The GC shall acknowledge receipt of the CB on the Project Management Web Site as instructed in the Tutorial Manual provided to the awarded contractor.

B. The GC shall notify all Sub-contractors of the CB and publish the CB to all field sets of drawings and specifications as appropriate.

C. The GC shall execute the directives of the CB or submit COR documentation as necessary during the execution and implementation of the CB.

1. See Specification 01 26 57 Change Order Request (COR)

END OF SECTION

SECTION 01 26 57
CHANGE ORDER REQUESTS (COR)

PART 1 – GENERAL

1.1. SUMMARY

A. Except in cases of emergency, no changes in the Work required by the Contract Documents may be made by the General Contractor (GC) without having prior approval of the City Engineer or his representative.

B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in the Work by written Change Order (CO). Such changes may include additions and/or deletions.

C. Where the City desires to make changes in the Work through use of written Change Order Request (COR), the following procedures apply:

1. If requested by the City, the GC shall prepare and submit a detailed proposal, including all cost and time adjustments to which the GC believes it will be entitled if the change proposed is incorporated into the Contract. The City shall be under no legal obligation to issue a Change Order for such proposal.
2. The parties shall attempt in good faith to reach agreement on the adjustments needed to the Contract to properly incorporate the proposed change(s) into the Work. In the event that the parties agree on such adjustments, the City may issue a Change Order and incorporate such changes and agreed to adjustments, if any.
3. In some instances, it may be necessary for the City to authorize Work or direct changes in Work for which no final and binding agreement has been reached and for which unit prices are not applicable. In such cases the following shall apply.
    a. Upon written request by the City, the GC shall perform proposed Work
    b. The cost of such change may be determined in accordance with this specification.
    c. In the event agreement cannot be accomplished as contemplated herein, the City may authorize the Work to be performed by City forces or to hire others to complete the Work. Such action on the part of the City shall not be the basis of a claim by the GC for failure to allow it to perform the changed Work.

D. Where changes in the Work are made by the City through use of a force account basis, the GC shall as soon as practicable, and in no case later than ten (10) working days from the receipt of such order, unless another time period has been agreed to by both parties, give the City written Notice, stating:

1. The date, circumstances and source of the extra work; and,
2. The cost of performing extra work described by such Order, if any; and,
3. Effect of the order on the required completion date of the Project, if any.

E. The giving of each Notice by the GC as prescribed by this specification, shall be a requirement to liability of the City for payment of any additional costs incurred by the GC in implementing changes in the Work. Under this specification, no order or statement of the City shall be treated as a Change Order, or shall entitle the GC to an equitable adjustment of the terms of this Contract or damages for costs incurred by the GC on any activity for which the Notice was not given.

F. In the event Work is required due to an emergency as described in this specification the GC must request an equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the commencement of such emergency.

G. All GC requests for equitable adjustment shall be submitted to the CPM per the specifications below. Such requests shall set forth with specificity the amount of and reason(s) for the proposed adjustment and shall be accompanied by supporting information and documents.

H. No adjustment of any kind shall be made to this Contract, if asserted by the GC for the first time, after the date of final payment.

I. This specification shall be used by the GC when preparing documentation for any COR to ensure each has been properly and completely filled out as required by the City of Madison.

J. All COR documentation will be processed through the Construction Administration-Change Order Request Library on the Project Management Web Site (PMWS).

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 26 46 Construction Bulletins (CB)
C. Section 01 26 63 Change Order (CO)
D. Section 01 31 23 Project Management Web Site
E. Section 01 91 00 Commissioning

F. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".

1. Use the following link to access the Standard Specifications web page:
   http://www.cityofmadison.com/business/pw/specs.cfm
   a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
   b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.

1.3. DEFINITIONS AND STANDARDS

A. LABOR: The amount of time and cost associated with the performance of human effort for a defined scope of Work. Labor is further defined as follows:
   1. Labor rate is the total hourly rate which includes the basic rate of pay, fringe benefits plus each company's cost of required insurance, also referred to as a reimbursable labor rate.
   2. Unit labor is the labor hours anticipated to install the corresponding unit of material.
   3. Labor cost is the labor hours multiplied by the hourly labor rates.

B. MATERIAL: Actual material cost is the amount paid, or to be paid, by the GC for materials, supplies and equipment entering permanently into the Work, including cost of transportation and applicable taxes. The cost shall not exceed the usual and customary cost for such items available in the geographical area of the project

C. LARGE TOOLS AND MAJOR EQUIPMENT: Large tools and major equipment are those with an initial cost greater than $1,500, whether from the GC or other sources.
   1. Tool and equipment use and time allowed is only for extra work associated with change orders.
      a. Rental Rate is the machine cost associated with operating a piece of equipment for a defined length of time (hour, day, week, or month) and shall not exceed the usual and customary amount for such items available in the geographical area of the project.
      b. Rental cost is the rental rate multiplied by the anticipated duration the equipment shall be required.
   2. The GC shall provide a breakdown of all rental rates to indicate what items and costs are associated with the rate. Examples of items to include in the breakdown would be fuel consumption, lubrication, maintenance and other similar expenses but not including profit and overhead.
   3. When large tools and equipment needed for Change Order work are not already at the job site, the actual cost to get the item there is also reimbursable.

D. BOND COST: The cost shall be calculated at 1% of the total proposed change order.

E. SUB-CONTRACTOR COSTS: Sub-contractor costs are for those labor, material, and equipment costs required by subcontracted specialties to complete the Change Order work including allowable markups as outlined within this specification.

F. OVERHEAD AND PROFIT Markup: The allowable markup percentage to a COR by the GC and Sub-contractors for overhead and profit. All of the following are expenses associated with overhead and profit and shall not be reimbursable as individual items on any COR:
   1. CHANGE ORDER PREPARATION: All costs associated with the preparing and processing of the change order.

2. DESIGN, ESTIMATING, AND SUPERVISION: All such efforts, unless specifically requested by Owner as additional Work to be documented as a COR or portion thereof.
3. INSTALLATION LAYOUT: The layout required for the installation of material and equipment, and the installation design, is the responsibility of the GC.
4. SMALL TOOLS AND SUPPLIES: The cost of small hand tools with an initial cost of $1,500 or less, along with consumable supplies and expendable items such as drill bits, saw blades, gasoline, lubricating or cutting oil, and similar items.
5. GENERAL EXPENSE: The general expense, which is those items that are a specific job cost not associated with direct labor and material such as job trailers, foreman truck, and similar items.
6. RECORD DRAWINGS: The preparation of record or as-built drawings.
7. OTHER COSTS: Any miscellaneous cost not directly assessable to the execution of the Change Order including but not limited to the following:
    a. All association dues, assessments, and similar items.
    b. All education, training, and similar items.
    c. All drafting and/or engineering, unless specifically requested by Owner as additional Work to be documented as a Change Order proposal or portion thereof.
    d. All other items including but not limited to review, coordination, estimating and expediting, field and office supervision, administrative work, etc.

G. Contract Extension: The necessary amount of time to be added to the contract deadlines for the completion of a change order.

1.4. CONTRACT EXTENSION

A. The GC shall not assume that every COR will require a Contract Extension. If the GC feels a contract extension is warranted he/she shall provide sufficient scheduling information that shows how the COR being requested impacts the critical path of the project.

B. The City of Madison strongly encourages the GC to explore alternative methods and practices prior to submitting a COR with a request for contract extension.

1.5. OVERHEAD AND PROFIT MARKUP

A. Pursuant to the City of Madison Standard Specifications for Public Works Construction, Section 104.7, Extra Work, the following maximum allowable markups shall be strictly enforced on all change orders associated with the execution of this contract.
    1. The total maximum overhead and profit shall not exceed fifteen percent (15%) of the total costs.
    2. The total maximum overhead and profit shall be distributed as follows:
        a. For work performed and materials provided solely by the General Contractor, fifteen percent (15%) of the total costs.
        b. For work performed and materials provided solely by Sub-contractors and supervised by the General Contractor:
            i. Supervision of the GC, five percent (5%) of the total Sub-contractor cost.
            ii. Sub-contractors work and materials ten percent (10%) of the total Sub-contractor cost.

1.6. PERFORMANCE REQUIREMENTS

A. The GC shall become thoroughly familiar with this specification as it will identify procedures and expenses that are or are not allowed under the Change Order and Change Order Request process.

B. The GC shall be responsible for all of the following:
    1. Carefully reviewing the CB that is associated with the COR.
    2. Collecting required supporting documentation from all contractors that quantify the need for a COR.
        a. Labor hours and wage rates
        b. Material costs
        c. Equipment costs

C. The following shall apply to establishing prices for labor, materials, and equipment costs:
    1. Where Work to be completed has previously been established by individual bid items in the contract bid proposal the GC shall use the unit bid prices previously established.
    2. Where Work to be completed was bid as a Lump Sum without individual bid items the GC shall provide a breakdown of all labor, materials, equipment including unit rates and quantities required.

D. The completion date is determined by Owner. The schedule, however, is the responsibility of the GC. Time extensions for extra Work will be considered when a schedule analysis of the critical path shows that the Change Order Request places the Work beyond the completion date stated in the Contract.

1.7. QUALITY ASSURANCE

A. The GC shall be responsible for ensuring that all COR supporting documentation meets the following requirements prior to completing the COR form on the Project Management Web Site:
   1. Sufficiently indicates labor, material, and other expenses related to completing the intent of the CB.
   2. No costs exceed the usual and customary amount for such items available in the geographical area of the project, and no costs exceed those established under the contract.

B. The Project Architect (PA), Commissioning Agent (CxA), City Project Manager (CPM), other members of the consulting staff, and city staff shall review all COR requests to ensure that the intent of the CB will be met under the proposal of the COR or request additional information as necessary.

PART 2 – PRODUCTS

2.1. CHANGE ORDER REQUEST FORM

A. The COR form is located on the Project Management Web Site. The GC shall click the link in the left margin of the project web site opening a new form. Follow additional instructions below in the execution section for filling out the form.

PART 3 - EXECUTION

3.1. ESTABLISHING A CHANGE ORDER REQUEST

A. Upon receipt of a Construction Bulletin (CB) where the GC believes a significant change in contract scope warrants the submittal of a COR the GC shall do all of the following within ten (10) working days after receipt of the CB:
   1. Review the CB with all necessary trades and sub-contractors required by the change in scope.
      a. Additions or deletions to the contract scope shall be as directed within the CB.
      b. Additions or deletions of labor and materials shall be determined by the GC based on the directives of the CB.
   2. Assemble all required back-up documentation for additions and deletions of materials, labor and other related contract costs as previously outlined in this specification.
   3. Submit a COR request form on the Project Management Web Site.

B. Submitting a COR does not obligate the GC to complete the work associated with the COR nor does it obligate the Owner to approve the COR as a change to the contract.

3.2. SUBMIT A CHANGE ORDER REQUEST FORM

A. This specification shall provide a subject overview only. In depth instructions shall be provided to the awarded Contractor in a PDF Instructional Manual.

B. The GC shall select the “Submit a COR” link on the Project Management Web Site.

C. The software will open a new COR form and the GC shall provide all of the following information:
   1. DO NOT perform any calculations on this worksheet, only provide the raw data as requested below. All calculations, totals, and markups shall be computed as described within this specification.
   2. Provide a summary description of the COR request, and justification for any requested time extension to the contract, indicate the number of calendar days being requested for the extension and add any attachments to the form as needed.
   3. Provide all GC self performance data including all of the following:
      a. Materials description, quantities, and unit costs.
      b. Labor hours and rates for all Foremen, Journeymen, and Apprentices by trade.
      c. Equipment descriptions, quantities, unit costs and rates.
   4. Provide all Sub-contractor data including all of the following:
      a. Materials description, quantities, and unit costs.
      b. Labor hours and rates for all Foremen, Journeymen, and Apprentices by trade.
      c. Equipment descriptions, quantities, unit costs and rates.
   5. Ensure all calculations performed by the form have been completed correctly. Contact the CPM directly if you suspect an error before hitting the save button.

C. At any time after creating a COR you must at a minimum click “Save as Draft” to save your work.

D. When all data has been entered and verified click on the “Submit COR” button. This will kick off the COR Review and Approval process.

3.3. CHANGE ORDER REQUEST REVIEW, APPROVAL, AND PROCESSING

A. The PA and CPM shall review all CORs submitted by the GC.
   1. Additional consulting staff and city staff having knowledge of the components of the COR shall review and advise the PA and CPM as to the accuracy of the items, quantities, and associated costs of the COR as directed by the CB.
   2. The CPM shall review the COR with the Owner.

B. If required the PA and CPM, shall in good faith, further negotiate the COR with the GC as necessary. All amendments to any COR shall be documented within the Project Management Web Site software.

C. After final review of the COR the CPM and Owner may accept the COR.

D. The CPM shall prepare the COR in the form of an official Board of Public Works Change Order for final review and approval as outlined in Section 01 26 63 Change Order (CO).

E. The GC shall not act upon any accepted COR until it has received final approval through the Public Works process as an official CO to the Work unless instructed to do so by the CPM. Proceeding without the final approval of a fully authorized Change Order is at the GC's own risk.

3.4. EMERGENCY CHANGE ORDER REQUEST

A. In the event Work is required due to an emergency as described in the Contract Documents, the GC must request an equitable adjustment as soon as practicable, and in no case later than ten (10) working days of the commencement of such emergency.

B. The GC shall provide full documentation of all labor, materials and equipment used during the period of emergency as part of the COR submittal.

END OF SECTION

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SECTION 01 26 63
CHANGE ORDER (CO)

PART 1 – GENERAL

1.1. SUMMARY

A. Except in cases of emergency, no changes in the Work required by the Contract Documents may be made by the General Contractor (GC) without having prior approval of the City Project Manager (CPM).

B. The City may at any time, without invalidating the Contract and without Notice to Sureties, order changes in the Work by written Change Order. Such changes may include additions and/or deletions.

C. The Change Order (CO) is a Board of Public Works (BPW) form that is reviewed and approved by a specific process.

D. The CO form is typically made up of multiple Change Order Requests (CORs) and/or Bid Items as appropriate depending on the type of project and how the contract was bid.

E. All CO documentation shall be processed through the Construction Administration-Change Order Library and digital workflow on the Project Management Web Site (PMWS).

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 26 46 Construction Bulletin (CB)
C. Section 01 26 63 Change Order Request (COR)
D. Section 01 31 23 Project Management Web Site
E. Section 01 91 00 Commissioning

1.3. BOARD OF PUBLIC WORKS PROCEDURE

A. The Board of Public Works has a very explicit procedure for the review and approval of all change orders associated with any Public Works Contract as follows:

1. The Supervisory Chain of the CPM shall review and approve any CO under $10,000 provided it does not include either of the following:
   a. The CO does not request a time extension to the contract.
   b. The CO does not cause the contract contingency sum to be exceeded.
2. The Board of Public Works shall review and approve any CO that requires any of the following:
   a. Any CO over $10,000.
   b. Any CO requesting a time extension to the contract regardless of the monetary value of the CO.
   c. Any CO that that causes the contract contingency sum to be exceeded.

B. The Board of Public Works generally meets every other week and only once in August and December. The GC is cautioned that, under normal scheduling, a CO requiring a BPW review will take a minimum of two (2) weeks to achieve final approval.

1. The City shall not be responsible for additional delays to the Work caused by the scheduling constraints of the Board of Public Works.

C. *SPECIAL NOTE:* The GC is cautioned to never proceed unless told to do so by the CPM. Only in rare instances may the CPM give a written notice to proceed on a COR without an approved CO. Proceeding without the written notice of the CPM or an approved CO is at the GC's own risk.

PART 2 – PRODUCTS

2.1. CHANGE ORDER FORM

A. The CO form is located on the Project Management Web Site. The CPM shall click the link in the left margin of the project web site opening a new form. Project information is pre-loaded, the CPM only needs to enter information and make attachments as needed to complete the form.

PART 3 - EXECUTION

3.1. PREPARATION OF THE CHANGE ORDER

A. The CPM shall prepare the required CO forms in the Construction Administration-Change Order Library on the Project Management Web Site as follows:
   1. Provide information for all contract information.
   2. Provide a general description of the items described within the change order.
   3. Provide detailed information for each Item on the CO form. At the option of the CPM he/she may include multiple Change Order Requests each as their own item.
   4. Provide required pricing and accounting information as needed for the item.
   5. Insert attachments of contractor/architect provided information that clarifies and quantifies the CO. Attachments may include but not be limited to material lists, estimated labor, revised details or specifications, and other documents that may be related to the requested change.
   6. Save the final version of the completed CO.

3.2. EXECUTION OF THE CHANGE ORDER

A. Upon saving the CO as described in section 3.1 above the software associated with the Project Management Web Site shall notify the GC that the CO has been drafted and is ready for review. The GC shall do the following:
   1. Open the appropriate CO form in the Construction Administration-Change Order Library and review all items on the form.
   2. The GC shall notify the CPM immediately of any errors or discrepancies on the form and shall not sign or save it.
      a. The CPM shall make any corrections as needed, re-save the form, and notify the GC.
   3. If/when the GC concurs with the CO form as drafted the GC shall digitally sign the form and click SAVE.

B. After the GC digitally signs/saves the CO it shall be routed through the Project Management Web Site for additional review and/or approvals. The CPM shall do the following:
   1. Monitor the review process to ensure the software is working properly at each review step.
   2. Ensure that proper BPW procedures are executed as needed by the CO approval process.
      a. Schedule the CO on the next available BPW agenda if required.
         i. Attend the BPW meeting to speak on the CO to board members and answer questions.
         ii. The GC and/or PA may be required to attend the BPW meeting to address specific information as it relates to the Work and/or materials associated with the CO.
   3. Monitor final approval and distribution of the CO.
   4. Notify the GC that the CO has been completed.
   5. Ensure that the CO is posted to the next Public Works payment schedule.
   6. Verify that the GC's next Progress Payment-Schedule of Values show the CO as part of the contract sum.

C. Upon final approval of the CO the GC may proceed with executing the Work associated with the CO.

END OF SECTION

SECTION 01 29 73
SCHEDULE OF VALUES

PART 1 – GENERAL

1.1. SUMMARY

A. The Schedule of Values (SOV) is a Contractor provided statement that allocates portions of the total contract sum to various portions of the contracted work and shall be the basis for reviewing the Contractors Progress Payment Requests.

B. AIA Document G702 – Application and Certificate for Payment and AIA Document G703 Continuation Sheet shall be filled out in sufficient detail to be used as a guideline in determining work completed and materials stored on site when verifying Progress Payment Requests.

C. The General Contractor shall be responsible for filling out, updating, and providing these work sheets with each Progress Payment Request.

1.2. RELATED SPECIFICATIONS

A. Section 01 26 63 Change Order (CO)
B. Section 01 29 76 Progress Payment Procedures
C. Section 01 31 23 Project Management Web Site
D. Section 01 32 26 Construction Progress Reporting
E. Section 01 33 23 Submittals

F. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".

1. Use the following link to access the Standard Specifications web page:
   http://www.cityofmadison.com/business/pw/specs.cfm
   a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
   b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.

1.3. RELATED DOCUMENTS

A. The following documents shall be used as the basis for initiating and maintaining the SOV worksheets throughout the execution of this contract.

1. Drawing documents and specifications (including general provisions) as provided with the bid set documents and any published addendums.
2. Documents associated with revisions or clarifications to number 1 above after awarding of the contract, including but not limited to:
   a. Construction Bulletins
   b. Request for Information
   c. Approved Change Orders
3. The latest daily/weekly Construction Progress Report
4. Other specifications as identified in Section 1.2 above

1.4. BASIS OF VALUES

A. The Contractor shall provide a breakdown of the Contract Sum in sufficient detail to assist the Architect and City Project Manager in evaluating Progress Payment Requests. The breakdown detail may require a labor and material breakdown for each division of work or trade or as directed by the CPM.

B. The total sum of all items shall equal the Contract Sum.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. AIA DOCUMENT G702 – APPLICATION AND CERTIFICATE FOR PAYMENT

A. The Contractor shall use AIA Document G-702 Application and Certificate for Payment with each Progress Payment Request.

B. Completely fill out the Project Information section as follows:
   1. TO OWNER; provide all owner related information as provided in the contract documents.
   2. PROJECT; provide all contract information including contract number, title and address.
   3. FROM CONTRACTOR; provide all contractor related information.
   4. VIA ARCHITECT; provide all the architect's related information including the architect's project reference number if different from the owners.
   5. Indicate the current APPLICATION NO., PERIOD TO date, and CONTRACT DATE.

C. Completely fill out the Contractors Application for Payment section.
   1. Fill out lines 1 through 9 to reflect the current status of the contract through the payment date being requested.
   2. The City of Madison calculates retainage on Public Works Contracts as follows:
      a. In general, across the duration of the contract, 2.5% of the total contract sum, including change orders, is withheld for retainage as referenced from the City of Madison Standard Specification 110.2:
         i. Beginning with Progress Payment 1, 5% retainage will be withheld until such time that 50% of the total contract sum has been paid out.
         ii. No additional retainage will be withheld after 50% of the total contract sum has been paid, unless additional change orders have been approved after the 50% milestone has been reached. Per City of Madison Standard Specification 110.2, additional retainage up to 10%, may be held in the event there are holds placed by Affirmative Action or liquidated damages by BPW.
         iii. Retainage for additional change orders after the 50% milestone will be withheld at the rate of 2.5% of the total cost of the change order.
         iv. Retainage is based on the change orders posted to the City's contract worksheet at the time the progress payment is processed.

D. Completely fill out the Change Order Summary section. Only change orders that have been finalized and posted to the City of Madison's Application for Partial Payment worksheet may be itemized into the SOV documents.

E. The Contractor shall sign and date the application and it shall be properly notarized.

F. The Contractor shall not fill in any information in the Architects Certificate for Payment section.

3.2. AIA DOCUMENT G703 – CONTINUATION SHEET

A. The Contractor shall use AIA Document G-703 Continuation Sheet to itemize his/her SOV for this contract. Provide additional sheets as necessary.

B. Provide information in Column A (Item No.), Column B (Description of Work), and Column C (Scheduled Value) by any method that allocates portions of the total contract sum to various portions of the contracted work. Possible methods include combinations of the following:
   1. By division of work
   2. By contractor, sub-contractor, sub sub-contractor
   3. By specialty item or group
   4. Other methods of breakdown as may be requested by the City Project Manager or City Construction Manager at the pre-construction meeting.

C. Provide total cost of the item/description of work including proportionate shares of profit and overhead related to the item.

3.3. INITIAL SCHEDULE OF VALUES SUBMITTAL

A. The Contractor shall upload his/her initial SOV to the Project Management Web Site, Submittals Library, no later than five (5) working days after the Pre-construction Meeting.
   1. The initial SOV shall provide information in Column A (Item No.), Column B (Description of Work), and Column C (Scheduled Value) only.
   2. The level of detail shall be as described in section 3.2 above.

B. The Project Architect (PA) and the City Project Manager (CPM) shall review the SOV as any other submittal and may require modifications to reflect additional detail as necessary.

C. The Contractor shall resubmit the SOV as necessary until such time as the PPA and CPM have sufficient detail for assessing and approving future Progress Payment Applications.

D. Progress Payment Application 1 will not be processed until such time as the Contractor has met this requirement regardless of the amount of work completed per the application.

3.4. SOV FOR PROGRESS PAYMENT REQUESTS

A. The Contractor shall update the initial SOV with each Progress Payment Application as follows:
   1. Initial items and values as part of Section 3.3 above will not be adjusted once the original Schedule of Values submittal has been approved.
   2. Change orders shall be added as additional items and values at the bottom of the SOV as they become approved and posted to the City's contract worksheet. The value for each change order shall be the value indicated on the SOV and shall stand alone. Values shall not be split out or combined with other existing items with similar work descriptions on the original SOV.
   3. Fill out Columns D, E, F and G to properly reflect the work completed and materials received since the last Progress Payment Application.
   4. Only materials delivered and stored on the project site may be reflected on SOV progress updates.

B. Provide updated G702 and G703 sheets with each Progress Payment application.

C. See Specification 01 29 76 Progress Payment Procedures for additional information on submitting Progress Payment Applications.

END OF SECTION

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SECTION 01 29 76
PROGRESS PAYMENT PROCEDURES

PART 1 – GENERAL

1.1. SUMMARY

A. The General Contractor (GC) shall review this and all related specifications prior to submitting progress payment requests.

B. Progress payment requests (Partial Payment-PP) for this contract shall be uploaded digitally by the GC to the Project Management Web Site

C. The Project Architect (PA) and City Project Manager (CPM) shall review and amend or approve the PP on the Project Management Web Site.

D. After approval of the PP by the CPM, he/she shall forward the PP to the appropriate agencies for BPW contractual review and payment processing.

1.2. RELATED SPECIFICATIONS

A.	Section 01 26 63	Change Order (CO)
B.	Section 01 29 73	Schedule of Values
C.	Section 01 31 19	Progress Meetings
D.	Section 01 31 23	Project Management Web Site
E.	Section 01 32 16	Construction Progress Schedules
F.	Section 01 32 26	Construction Progress Reporting
G.	Section 01 33 23	Submittals
H.	Section 01 45 16	Field Quality Control Procedures
I.	Section 01 77 00	Closeout Procedures
J.	Section 01 78 13	Completion and Correction List
K	Section 01 78 23	Operation and Maintenance Data
L.	Section 01 78 36	Warranties
M.	Section 01 78 39	As-Built Drawings
N.	Section 01 78 43	Spare Parts and Extra Materials
O.	Section 01 79 00	Demonstration and Training

1.3. RELATED DOCUMENTS

A. The following documents shall be used when evaluating PP requests.

1. Daily and weekly construction progress reports filed since the last payment request.
2. Contractors Schedule of Values as updated from the last payment request. See Specification 01 29 73.
3. Any document that may be required to be submitted for review and approval, as noted by the specifications listed in Section 1.2 above, or the Progress Payment Milestone Schedule in Section 1.4 below, to achieve a required bench mark of contract progression or contract requirement.

1.4. PROGRESS PAYMENT MILESTONES

A. City Engineering-Facility Management has developed the Project Payment Milestone Schedule (Section 1.4 below) to assist the GC in providing required construction specific documentation and general contractual documentation in a timely manner.

B. The Progress Payment Milestone Schedule is not an all inclusive list. Multiple agencies review progress payment requests and contract closeout requests. Missing, incomplete, or incorrect documentation for any agency may

be a cause for not processing progress payments. It shall be the sole responsibility of the Contractor for providing documentation as required or requested to the appropriate agencies.

C. The milestone schedule is based on the contract total sum and shall be valid for most contracts. Milestone submittals will be required with whatever progress payment hits the percentage of contract total indicated in the schedule.

D. The CPM shall review the milestone schedule with each progress payment request and at his/her option may elect to hold processing the progress payment until such time as the contractor has met the requirements for providing construction specific documentation.

E. It shall be the General Contractors responsibility to comply with all BPW Contract Administration requirements and related deadlines as outlined in the Award Letter, Award Checklist, and Start Work Letter.

Progress Payment (PP) Milestone Schedule		
Milestone Description	***Due Before***	***Remarks***
BPW Contract Administration Documentation • Workforce profiles • Best Value Contracting Documentation • Sub-contractors prequalification approval & Affirmative Action plans • Other as may be required	PP-1, or start work as applicable	• For GC and Sub-contractors before PP-1 regardless of scheduling • Sub-contractors (if applicable), due 10 days before they may start work • Sub-contractors (if applicable), due 10 days before they may start work
Required Construction Submittals/Administrative Documents • Contractors Project Directory • Schedule of Values • Submittals Schedule • Waste Management Plan • Closeout Requirement Checklist • Warranty Checklist	PP-1	References • Specification 01 31 23 • Specification 01 29 73 • Specification 01 32 19 • Specification 01 74 19 • Specification 01 77 00 • Specification 01 78 36 • Various specifications.
Construction Progress Milestones • Early submittals, per submittal schedule • Detailed Contract Schedules	PP-1	See specifications for specific requirements • Specification 01 32 19, Examples: concrete mix, structural steel, products with long lead times • See Specification 01 32 16
General Construction Progress Requirements are all up to date • Progress Schedules • Submittals/Re-submittals (ongoing) • Schedule of Values • Progress Reporting • LEED Documentation • Waste Management documentation • QMOs are being addressed and closed • Progress Cleaning • As-Built Drawings	Each future PP	Verified with each Progress Payment Request • Specification 01 32 16 • Specification 01 33 23 • Specification 01 29 73 • Specification 01 32 26 • All specifications with LEED documentation requirements • Specification 01 74 19 • Specification 01 45 16 • Specification 01 74 13 • Specification 01 78 39
*** All of the above are being updated on the Project Management Web Site as required**		
BPW Contract Administration Documentation • Weekly payroll reports • Best Value Contracting Reports	25% CT or PP 2	See 1.4.E above. *This progress payment will be with held by BPW for any missing contractual documentation.*

Progress Payment (PP) Milestone Schedule		
Milestone Description	***Due Before***	***Remarks***
• SBE Reports		
Construction Progress Milestones • Construction/Contract Closeout Meeting #1 • Submittals/Re-submittals complete	50% CT	• Specification 01 31 19 • Specification 01 33 23
Operation and Maintenance (O & M) drafts	60% CT	• Specification 01 78 23
Construction/Contract Closeout Meeting #2 • Construction closeout checklist	70% CT	• Specification 01 31 19 • Specification 01 77 00
BPW Contract Administration Documentation • Request Finalization Review from BPW	80% CT	This is a recommendation to the GC and is not a requirement of this PP. • Specification 01 77 00
Construction Progress Milestones • Operation and Maintenance (O & M) finals, accepted • All major QMO issues resolved • As-Built Drawings, Division Trades ready for GC review	80% CT	• Specification 01 78 23 • Specification 01 45 16; Items that could prevent occupancy • Specification 01 78 39
All of the following shall be completed for this PP: • Regulatory Inspections completed • All QMO reports closed • Demonstration and Training completed • Attic Stock completed • Final Cleaning	90% CT	Contractor to determine the proper order of completion: • Governing ordinances and statutes • Specification 01 45 16 • Specification 01 79 00 • Specification 01 78 43 • Specification 01 74 13
Construction Closeout Procedures: • Letter of Substantial Compliance sent to BI and DHS as needed • Certificate of Occupancy issued • As-Built Drawings, finals, accepted • City Letter of Substantial Completion • Warranty letters dated and issued	100% CT	• Specification 01 77 00 • Generated/Signed by the Architect • Building Inspection • Specification 01 78 39 • Signed by the City Engineer • Specification 01 78 36
*** Completion of this begins the one year warranty.**		
BPW Contract Administration Documentation Contract Closeout Procedures • Construction Closeout has been completed • Contractor requests final payment of retainage upon receiving City Letter of Substantial Completion • All BPW contractual requirements are verified	Final	• Specification 01 77 00 • Contractor must provide any missing BPW Contractual Documentation
*** Completion of this closes the contract but not the warranty period/bond.**		

Progress Payment (PP) Milestone Schedule		
Milestone Description	***Due Before***	***Remarks***
***NOTE:* CT = Contract Total less held retainage**		

1.5. PROGRESS PAYMENT SUBMITTAL

A. Each progress payment submittal shall be:
   1. Digital in PDF format
   2. PDF shall be in color
   3. Uploaded to the appropriate Project Management library and properly named per the tutorial instructions provided to the awarded contractor.

B. Submit all required construction progress documentation to the appropriate Project Management Web Site library.

C. In general the following shall apply to all PP requests:
   1. Materials or products:
      a. On order, being shipped, etc. may not be invoiced.
      b. Received and stored on the project site may be invoiced.
      c. Being manufactured off site at any location may not be invoiced (example: cabinetry, ductwork, etc.)
      d. Completed products stored off site locally waiting for delivery to the project site may be invoiced with prior approval by the CPM. All of the following conditions must be met to be allowed:
         i. Items must be visually inspected by CPM to verify product is complete.
         ii. Item must be stored inside a compatible structure and the structure and contents must be insured.
         iii. Contractor is responsible for condition until installation is completed.
   2. All labor and equipment, including rental time for the current progress period may be invoiced.
   3. Only completed installations may be invoiced to 100% based on the Schedule of Values.

D. DO NOT submit BPW Contract Administration Documentation for review with Progress Payment Requests, submit them directly to the correct agency and in the correct format as instructed from information in your BPW Contract Award Packet instructions.

PART 2 - PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL CONTRACTOR PROCEDURE

A. The GC shall provide an updated version of his/her schedule of values (AIA documents G702 & G 703) with each PP request.
   1. The AIA - Application and Certificate for Payment (G702) shall be properly filled out and prepared for the Architects review. See specification 01 29 73, Schedule of Values for more information.
   2. The AIA - Continuation sheets (G703) shall be properly filled out and indicate the dollar value of the completed work to date for each item on the form. See specification 01 29 73, Schedule of Values for more information.
      a. The GC shall subtotal the work completed to date for all of the original Schedule of Value items.
      b. Divide the sub total of work completed by the Original Contract Total to obtain a percentage complete of the original Lump Sum Bid. This percentage may be taken out to five (5) decimal places (round fifth place up or down as needed).
         i. Example: $5,192.55 of completed work divided by $10,000 original Contract Total = 0.519255, round this to 0.51926
      c. Write the percentage in Column 10 on the City Tabular Sheet for the original lump sum bid item in RED ink.
   3. Ensure that any newly posted change orders from the City of Madison provided tabulation sheet have been entered on the G703 continuation sheets. Repeat steps a thru c above for each change order on the schedule of values and the City Tabular Sheet.

B. The GC shall fill out the City of Madison Application and Certificate of Payment cover sheet as follows:
   1. The GC shall not change any pre-printed information and shall not write in the box that indicates previous progress payments.
   2. The GC shall sign and date the form where indicated.
   3. The GC shall provide the dates from and to for the PP being requested.

4. The GC shall provide the list of all contractors/sub-contractors that were actively working during the dates indicated above.
    a. All contractors/sub-contractors named must be in compliance with all City requirements (Pre-qualified, Affirmative Action Plan on file, etc). The PP will be held and not processed by the City of Madison until all contractors/sub-contractors are in compliance.
    b. Do not list the names of suppliers or manufacturers, doing so will slow down processing and require a re-submittal of the paperwork.

C. The General Contractor (GC) shall scan all of the documents listed below in the order shown, save the scan as a single PDF file for each PP request.
1. City cover sheet – Application and Certificate for Payment
2. City tabulation sheet(s)
3. AIA G702 - Application and Certificate for Payment
4. AIA G703 - Continuation Sheet(s)
5. Any miscellaneous documents that may be requested as backup documentation for the pay request.
    a. Lien waivers are not required and shall not be submitted.
    b. Do not provide contractual administrative documents such as pay reports with pay requests.
    c. Do not supply progress deliverables with pay requests.

F. Upload the pay request PDF to the Contract Documents-GC Partial Pay Apps library on the Project Management Web Site.

3.2. PROJECT ARCHITECT PROCEDURE

A. The PA shall review the AIA-continuation sheets provided by the GC to determine if the Schedule of Values accurately reflects the work completed for the inclusive dates indicated.

B. The PA shall advise the CPM of any discrepancies in the schedule of values.

C. The PA shall work with the GC and the CPM to resolve any issues prior to signing the AIA - Application and Certificate for Payment.

D. When verified, the PA shall digitally sign the original PDF version of the AIA - Application and Certificate for Payment on the Project Management Web Site.

3.3. CITY PROJECT MANAGER PROCEDURE

A. The CPM shall review all documents submitted by the GC and work with the PA to ensure the schedule of values accurately reflects the work completed to date.

B. The CPM may elect to hold processing of any progress payment pending submittal of required progress payment milestones.

C. When verified, the CPM shall digitally sign the City Cover Sheet and forward the required documentation to the appropriate City agencies for further processing of the payment request.

D. The CPM shall add a scanned copy of any documents indicating the PP request processing was completed to the PMWS.

END OF SECTION

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SECTION 01 31 13
PROJECT COORDINATION

PART 1 – GENERAL

1.1. SUMMARY

A. Project Coordination covers many areas within the execution of the Contract Documents and the requirements of proper coordination are the applicable to all contractors executing the Work of this contract.

B. This specification provides general information regarding project coordination for the General Contractor and all Sub-contractors. All contractors shall be familiar with project coordination requirements and responsibilities that may be defined in other specification within these Contract Documents.

C. The General Contractor shall at all times be responsible for the project, project site, and execution of the Contract Documents.

1.2. RELATED SPECIFICATIONS

A.	Section 01 29 76	Progress Payment Procedures
B.	Section 01 31 19	Progress Meetings
C.	Section 01 31 23	Project Management Web Site
D.	Section 01 32 16	Construction Progress Schedules
E.	Section 01 32 19	Submittals Schedule
F.	Section 01 33 23	Submittals
G.	Section 01 43 39	Mockups
H.	Section 01 45 16	Field Quality Control Procedures
I.	Section 01 60 00	Product Requirements
J.	Section 01 77 00	Closeout Procedures, including all specifications referenced therein
K.	Section 01 91 00	Commissioning

1.3. GENERAL REQUIREMENTS

A. The following general requirements shall applicable to all contractors:

1. Cooperate with the Owner, all authorized Owner Representatives, Project Architect and all consultants of the Owner.
2. Materials, products, and equipment shall be new, as specified and to industry standards except where otherwise noted.
3. Labor and workmanship shall be of a high quality and to industry standards.

B. Existing conditions:

1. Verify all existing conditions noted in the contract documents with actual filed locations. Verify dimensions, sizes and locations, of structural, equipment, mechanical and utility components.
2. Report any inconsistencies, errors, omissions, or code violations in writing to the General Contractor (GC) immediately.
3. Annotate any inconsistencies, errors, omissions on the GC As-Built record drawings immediately for future reference.

C. Contract Documents:

1. The Contract Documents are intended to include everything necessary to perform the work. Every item required may not be specifically mentioned, shown, or detailed.
   a. Except where specifically stated all systems and equipment shall be complete, installed, and fully operable.
   b. If a conflict exists within the contract documents the contractor shall furnish the item, system, or workmanship of the highest quality, largest, largest quantity, or most closely fits the intent of the contract documents.

c. Manufacturers recommended installation details shall be verified and used prior to installation of products and equipment so as to not void warranties.

D. Errors and Omissions
1. No Contractor shall take any advantage of any apparent error or omission in the construction documents.
2. The City of Madison shall be permitted to make such corrections and interpretations as may be deemed necessary for the fulfillment of the intent of the construction documents.

E. Owners Representatives
1. All contractors shall be familiar with various Owner Representatives having Quality Management responsibilities for the duration of this project including but not limited to the following:
a. Project Architect, responsible for all decisions affecting the code compliance and design intent of the construction documents.
b. Consulting Architects and Engineers, responsible for providing consulting services to the Project Architect, Owner, and City Project Manager, also responsible for Quality Management of the construction documents.
c. Owner, the designated representative of the City Agency that will occupy the project upon completion.
d. City Project Manager, responsible for all day to day decisions regarding the execution and performance of this Public Works Contract.
e. Consulting City Staff, responsible for providing consulting services to the Project Architect, Owner, and City Project Manager, also responsible for Quality Management of the construction documents.
f. Commissioning Agent (CxA), responsible for ensuring that the project is meeting the Owner's Project Requirements and related quality assurance procedures.
2. Owner Representatives shall be attending progress meetings, pre-installation meetings, performing or being present for final testing and acceptance and quality management reporting during the execution of the contract documents as outlined in other specifications.

1.4. GENERAL CONTRACTOR PERFORMANCE REQUIREMENTS

A. Assume the responsibility for all Work specified in the Contract Documents except where specifically identified to be performed by the Owner or other contractor separately hired by the Owner.
1. Coordinate all work by Owner, equipment provided Owner, or contractor hired by the Owner into the project schedule.

B. Provide all construction management responsibilities as specified in other Division 1 specifications including but not limited to:
1. Scheduling of work
2. Coordination of work between other Trades and Sub-contractors
3. Construction administration and management
4. Site layout, cleanliness, and protection of completed work/stored materials
5. Waste Management
6. Quality Assurance and Quality Control

C. Use Diggers Hotline and private utility locating companies to accurately locate all public and private utilities on the property as needed. The GC is responsible for any repair or replacement to any public or private utility damaged during the execution of the Work

D. Report any inconsistencies, errors, omissions, or code violations in writing to the Project Architect immediately. Failure to report inconsistencies prior to beginning work shall indicate that the GC accepted all existing conditions.

E. The GC shall be responsible for assigning work and related responsibilities where the Contract Documents may not clearly state who is responsible for providing the work, material, or product.

F. Provide construction management oversight of all items described in Section 1.5 below.

G. Coordinate and assist CxA as outlined within 01 91 00 and as directed by Owner.

1.5. SUB-CONTRACTOR PERFORMANCE REQUIREMENTS

A. Be familiar with all of the contract documents as they pertain to your Work, adjacent work and the overall progress of the project.
1. All Sub-contractors shall be familiar with all Division 1 specifications as they may apply to progress, progress payments, quality control construction management, and closeout of the contract.

B. Coordinate your Work with all adjacent work and existing conditions.

1. Perform your work in proper sequence according to the GC's project schedule and in relation to the work of other trades.
2. Notify other sub-contractors and trades whose work may be connected to, combined with, or influenced by your work and allow them reasonable time and access to complete their work.
3. Join your work to the work of others in accordance with the intent of the Contract Documents.
4. Order materials and schedule deliveries to facilitate the general progress of the Work.

C. Cooperate with all other trades to facilitate the general progress of the work. This shall include providing every reasonable opportunity for the installation of work by others and the storage of their materials and equipment.
1. In no case shall any contractor exclude from the premises or work any Sub-contractor or their employees.
2. In no case shall any contractor interfere with the execution or installation of Work by any other Sub-contractor or their employees.

D. Arrange your work, equipment, and materials and dispose of your construction waste so as to not interfere with the work or storage of materials of others.

E. Coordinate all work as indicated during pre-installation meetings with Owner Representatives, the GC and other trades. Any work improperly coordinated shall be relocated as designated by the Owner Representative at no additional cost to the City.

F. Coordinate and assist CxA as outlined within 01 91 00 and as directed by Owner.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 01 31 19
PROJECT MEETINGS

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to identify various project related meetings and the responsible parties for scheduling, agendas, minutes, and required attendance.

B. This specification is not intended to be inclusive of all meeting types or a complete list of required meetings.

C. This specification is not intended to cover planning and execution meetings between the General Contractor (GC) and his/her sub-contractors.

1.2. RELATED SPECIFICATIONS

A. 01 31 23 Project Management Web Site

B. 01 32 16 Construction Progress Schedules

C. 01 43 39 Mockups

D. 01 91 00 Commissioning

1.3. PROJECT MEETING TYPES

A. The following project meeting types may be used but not limited to the following

1. Preconstruction Meeting
2. Project Management Web Site – Tutorial Meeting
3. Construction Progress Meetings
4. Pre-installation Meetings (including mock-up review meetings)
5. Weekly Trade Meetings
6. Special Meetings
7. Commissioning Meetings

1.4. GENERAL REQUIREMENTS

A. Representatives of Contractors, Subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

PART 2 – PRODUCTS – NOT USED IN THIS SECTION

PART 3 - EXECUTION

3.1. PRECONSTRUCTION MEETING

A. After execution of the Contract the City Project Manager (CPM) shall schedule and conduct the Preconstruction Meeting at the Owner's facilities. The CPM shall coordinate the meeting agenda with the Project Architect and the GC Project Manager.

B. The CPM shall be responsible for the final agenda.

C. The CPM and Project Architect shall take notes on the meeting and post completed meeting minutes.

D. Attendance shall be required by all of the following:

1. Owner Representative(s)

2. Architect and applicable sub consultant(s)
3. General Contractor and applicable subcontractors and suppliers
4. City Quality Management Staff
5. Commissioning Agent
6. Others, as may be invited for particular agenda items.

E. Topics of the Preconstruction Meeting shall include but not be limited to the following:
1. Staff and contractor introductions
2. Completion Date
3. BPW Administrative requirements and due outs
   a. Small Business Enterprise (SBE) (if applicable)
   b. Certified payroll forms
   c. Workforce profiles
   d. Best Value Contracting (BVC)
4. General Facility Management Division 1 Specifications, including:
   a. Section 01 29 76 Progress Payment Procedures
   b. Section 01 31 23 Project Management Web Site (overview)
   c. Section 01 45 16 Field Quality Control Procedures
   d. Section 01 77 00 Closeout Procedures
   e. Section 01 91 00 Commissioning
5. Project Meeting scheduling
   a. Section 01 31 19 Project Meetings
6. Construction Schedule
7. Commissioning Process

3.2. PROJECT MANAGEMENT WEB SITE – TUTORIAL MEETING

A. The CPM shall schedule and conduct a tutorial presentation of the PMWS prior to the beginning of construction.
B. The CPM shall be responsible for the final agenda, there will be no minutes.
C. The required attendance list in 3.1.D. above shall apply except for City Staff in items 1 and 4 who are already familiar with the PMWS system.
D. It is recommended that all contractors bring their lap top, tablet or other internet capable device with them including a fully charged battery and internet connection devices as necessary.

3.3. CONSTRUCTION PROGRESS MEETINGS

A. In general all of the following shall apply:
1. Representatives of Contractors, Subcontractors, and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
2. The attendance shall be from the required attendance list in 3.1.D. above.

B. The General Contractor Project Manager (GCPM) shall:
1. Schedule and conduct all construction progress meetings biweekly or more frequently as required.
2. Prepare agenda for meetings including, but not limited to the following:
   a. Safety
   b. Current Schedule, including review of the critical path and 6-week look ahead schedule
   c. Status of project related documentation (Submittals, RFIs, CBs, etc.)
   d. Quality Observation Log and status of correction of deficient items
   e. Project questions and issues from meeting attendees
   f. BPW Administration Check
   g. Other as needed
   h. Status of CORs and COs to be reviewed outside the standard progress meeting time.
3. Make physical arrangements for meetings.
4. GCPM to post meeting agendas to the appropriate libraries on the Project Management Web Site (PMWS) no less than two (2) working days prior to the scheduled meeting. Notify all required attendees, applicable parties to the contract, and others affected of the posted meeting agenda.
5. Preside at meetings.
6. Route a meeting attendance roster for attendees to sign-in on.
7. GCPM to record the minutes of the meeting; include significant proceedings and decisions. Post meeting minutes to the PMWS no more than two (2) working days after the completed meeting. Meeting minutes shall include a scanned copy of the attendance sign-in sheet. Notify all required meeting attendees, applicable parties to the contract, and others affected by decisions made at the meetings.

8. The above requirements do not apply to GC/sub-contractor meetings.

3.4. PRE-INSTALLATION MEETINGS

A. The GCPM shall schedule and conduct all pre-installation meetings, including mockup reviews, before each construction activity that requires coordination with other trades.
B. The GCPM shall be responsible for the final agenda and meeting minutes.
C. The GCPM will work with all concerned parties to resolve issues as needed and submit RFI's if necessary.
D. Required attendance shall be from the list in 3.1.D. above and shall be personnel having a stake in the outcome of the installation or knowledge of the system being installed.
E. In the event the Contractor installs equipment or materials without a pre-installation meeting the Contractor shall be solely responsible for removing, replacing, repositioning materials and equipment as instructed by the Project Architect or City Project Manager at no additional cost to the City.

3.6 PRE-CONTRACT CLOSEOUT MEETINGS

A. Two (2) Pre-contract Closeout Meetings shall be held to review the closeout procedures, requirements, and contract deliverables.
   1. Pre-contract Closeout Meeting #1 shall be scheduled prior to the 50% Progress Payment Request is being requested. This meeting shall discuss items such as closing out QMO reports, providing O&M drafts and finals, payroll and Affirmative Action documentation, and other contract deliverables.
   2. Pre-contract Closeout Meeting #2 shall be scheduled prior to the 80% Progress Payment Request is being requested. This meeting shall discuss, but not be limited to, the status of scheduling final regulatory inspections, cleaning up outstanding QMO's, demonstration and training, attic stock; and finalization review of payroll and other related documents.
B. The GCPM shall schedule, coordinate, and make physical arrangements for both meetings.
C. All of the following shall be required to attend both meetings:
   1. The GCPM and the GC Field superintendent
   2. All Subcontractor Project Managers regardless of the current status of their work.
      a. The GCPM may excuse a Subcontractor PM if he is confident that all contractual requirements for closeout by the subcontractor have been completed and/or delivered to the GCPM. The list of attendees shall be reviewed and agreed upon with CPM ahead of the meeting.
      b. At the option of these project managers the field supervisors may also attend.
   3. The Project Architect and at least one design consultant from each discipline represented by the plans and specifications to address open QMOs, final tests, reports, etc.
   4. The Owner
   5. The CPM
   6. Quality Management staff as needed to address open QMOs, final tests, reports, etc.
   7. The Commissioning Agent
D. The CPM shall publish an agenda and chair the meeting.

3.7 OTHER SPECIAL MEETINGS

A. The Contractor shall schedule special meetings per the requirements of the LEED Specification, the Project Quality Management Plan, the Commissioning Plan and as indicated by other specifications.
B. Special meetings include but are not limited to the following:
   1. Waste Management Conference
   2. Equipment start up meetings
   3. Testing and balancing meetings
   4. Commissioning meetings
   5. Other meetings as necessitated by the contract documents

END OF SECTION

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SECTION 01 31 23
PROJECT MANAGEMENT WEB SITE

PART 1 – GENERAL

1.1. GENERAL DESCRIPTION

A. The City of Madison (CoM) has established a web based Project Management Tool (PMT) using a Microsoft product called SharePoint (SP).

B. The software is used throughout the design, construction and warranty process of major remodels and new construction projects executed as a City of Madison, Board of Public Works project.

C. Initially deployed in mid 2013, the PMT software has been successfully deployed on several projects, and we continue to modify/update/enhance the PMT on a regular basis.

1.2. SHAREPOINT PROCEDURE OVERVIEW

A. The CoM PMT is a system of consolidated Document & Form Libraries and Data Lists that assist in performing day to day functions of design/construction management while reducing the use of surface mail, email and email attachments.

1. Document libraries store a wide variety of documents in many different formats including but not limited to Word, Excel, PDF, photographs (all popular formats), etc.
2. Data Lists contain consolidated data information that can be generated and stored for further use. Punch Lists and Warranty issues will be examples of Data Lists.
3. Form libraries contain snapshot information associated with a particular Data Entry form. An example of this is the Quality Management Observation form.

B. The following libraries and sub-libraries on the PMWS are provided for specific workflows and contract documentation. Related specification numbers are in "( )" if applicable.

Contract Documents	Construction Administration	Construction Progress	LEED Documentation	Quality Control	Construction Closeout
Signed Contract	*Change Order Requests (COR Form) (01 26 57)*	*Schedules (01 32 16)*	*LEED Documents*	*Regulatory Inspections*	*Misc Closeout Documents*
GC Partial Pay Apps (01 29 76)	*Change Orders (CO Form) (01 26 63)*	*Progress Meetings (01 31 19)*	*Waste Management (01 74 19)*	*Commissioning Checklists*	*O & M Manuals (01 78 23)*
Construction Documents	*Construction Bulletins (CB Form) (01 26 46)*	*Daily Journal (DJ Form) (01 32 26)*		*System Performance Tests*	*Product Warranties /Guarantees (01 78 36)*
Regulatory Documents	*Request for Information (RFI Form) (01 26 13)*			*Quality Management Observation (QMO Form) (01 45 16)*	*As-Builts (01 78 39)*
Testing Contract	*Submittals (SUB Form) (01 33 23)*			*Safety and Incident Reports*	*Attic Stock (01 78 23)*
				Material Testing & Field Reports	*Demonstration and Training (01 79 00)*
					Warranty Issues (WI Form) (01 78 23)

C. A tutorial document on the web based PMT will be provided to the General Contractor (GC) who is awarded the contract. Additional training will be provided as needed for the GC and Sub-Contractors (SC) by the CoM.

D. The PMT has predefined work flows that channel automated alerts as documents are uploaded, reviewed, and completed. These workflows are designed for inbound information from the contractor as well as outbound information from the Architectural/Engineer consultant and the Owner.

E. The GC will be required to receive email notifications, access the internet to review related documentation and be able to upload/download documentation to the various project libraries.

F. The SC's will be required (at a minimum) to receive email notifications and access the internet to review related documentation. Prior to setting up the final PMT the GC and CPM shall meet to review all SP workflows, the GC will determine to what level over the minimum requirements the SC's will be involved.

1.3. RELATED SPECIFICATIONS

A. The following specification sections are directly related to the CoM PMT system.

1. 01 26 13 Request for Information (RFI)
2. 01 26 46 Construction Bulletins (CB)
3. 01 26 57 Change Order Request (COR)
4. 01 26 63 Change Order (CO)
5. 01 29 76 Progress Payment Procedures
6. 01 31 19 Project Meetings
7. 01 32 16 Construction Progress Schedules
8. 01 32 26 Construction Progress Reporting
9. 01 32 33 Photographic Documentation
10. 01 33 23 Submittals
11. 01 45 16 Field Quality Control Procedures (Owner)

PART 2 - PRODUCTS

2.1. SHAREPOINT SYSTEM RELATED PRODUCTS

A. SharePoint is a Microsoft Windows based software that requires no additional software installation, hardware or other special requirements/applications for the users. There are no costs associated with the use of this system.

B. Currently the CoM is using SharePoint 2010.

1. SharePoint works best if the user's computer is running Windows versions 7 through 8.1.
2. SharePoint works best when used with Internet Explorer versions 7, 8 and 9 (32 bit).
   a. At this time SharePoint is not fully supported by Internet Explorer versions 10 and 11.
   b. At this time SharePoint is not entirely compatible with other internet browsers such as Fire Fox, Google Chrome, and Safari.

PART 3 - EXECUTION

3.1. POST BID-OPENING

A. After bids have been opened, a successful bidder has been determined, and bid acceptance procedures have been initiated the City Project Manager (CPM) will contact the GC to provide the following information.

1. Project Management Software Tutorial. This tutorial is in a PDF printable format with screen shots and associated instructions on how to access and use the PMT.
   a. Tutorial instructions will include but not be limited to the following:
      i. Descriptions of various libraries, documents, and forms that will be used throughout the construction project.
      ii. Uploading procedures for various types of documents including standardized naming conventions.
2. A blank Project Directory in an Excel spread sheet format. The contractor shall provide the following information for GC and SC staffs as indicated on the spreadsheet. This will generally be the Project Manager for the GC as well as the Sub-contractors and the GC Site Supervisor.
   a. Last Name, First Name
   b. Company Name
   c. Email address (valid, work related)
   d. Work Phone Number (required, include area code)
   e. Cell Phone Number (not required, include area code)

3. The GC shall provide the above information for all SC's where the GC is not self-performing the work.
4. The GC may provide project foreperson information for work being self performed if he/she so desires.

3.2. POST PRE-CONSTRUCTION MEETING

A. The GCPM will return the completed Project Directory spread sheet to the CPM no later than the Pre-construction meeting.

B. The CPM is responsible for uploading all project directory data into SharePoint and coordinating with CoM Information Technology (CoM-IT) for creating the logins and passwords of non-city staff (GC/SC staffs).

C. All GC/SC staff will be notified through an automated email from CoM IT that logins and passwords are available. It is the responsibility of each GC/SC to call the CoM-IT number provided in the email to receive his/her login/password over the phone. Logins and passwords will not be released via email.

D. Once the GCPM has received his/her login/password uploading of contract related documents can begin. This would include but not be limited to project schedules, submittals, RFI's, and other documents as needed.

E. All workflows, review of documentation, and general archiving of construction related documentation will be conducted on the PMWS. These documents will generally not be emailed.

F. The following documents related to the execution of the contract will not be part of the PMWS:
   1. All documentation related to executing the contract, such as:
      a. Sub Contractors list
      b. Affirmative Action documentation
      c. Bonding documentation
      d. Documentation associated with payroll verification
      e. Final documentation associated with closing out the contract
   2. Any documentation required/generated by ordinance, code or statute, such as;
      a. Erosion Control inspections
      b. Building Inspection Department inspections

END OF SECTION

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SECTION 01 32 16
CONSTRUCTION PROGRESS SCHEDULES

PART 1 – GENERAL

1.1. SCOPE

A. This specification is to identify various project related schedules associated with indicating construction progress and outlook. The following schedules are the responsibility of the General Contractor (GC).
   1. Overall Project Schedule
   2. 6 Week Look-out Schedule

B. This specification is not intended to include internal schedules generated by the contractors during their planning and execution of the contract.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 31 19 Progress Meetings
D. Section 01 74 13 Progress Cleaning
E. Section 01 77 00 Closeout Procedures
F. Section 01 78 23 Operation and Maintenance Data
G. Section 01 78 36 Warranties
H. Section 01 78 39 As-Built Drawings
I. Section 01 78 43 Spare Parts and Extra Materials
J. Section 01 79 00 Demonstration and Training
K. Section 01 91 00 Commissioning
L. Other specification within the construction documents that may indicate the need for scheduling any event with Owner, Project Architect, Owner Representatives, including any owner provided equipment.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. OVERALL PROJECT SCHEDULE (OPS)

A. The GC shall prepare an OPS that covers the duration of the contract from the pre-construction meeting through the end of construction to final contract closeout.
   1. The GC shall review Specification 01 77 00 Closeout Procedures to become familiar with definitions, differences, and requirements for closing out the construction and contract including the association with progress payments.
B. The GC shall provide copies and lead a discussion on the OPS during the pre-construction meeting.
C. The OPS shall indicate start and end dates of each task associated with the project.
D. The OPS shall clearly indicate the critical path of the project.
E. The GC shall update the OPS as often as necessary during the duration of the project. Updates will be briefed as needed during bi-weekly progress meetings.

3.2. 6 WEEK LOOK-OUT SCHEDULES (LOS)

A. The GC shall prepare the initial LOS to include detail of daily tasks for the first six (6) weeks of construction in depth for the Pre-construction meeting. The LOS shall be compatible and complimentary to the OPS.
B. The GC shall provide copies and lead a discussion on the LOS during the pre-construction meeting.

C. The LOS shall indicate start and end dates of each major task, associated related sub-tasks, and required parallel or pre-requisite tasks required to complete the major task on time.

D. The LOS shall also include identifying and scheduling such events as:
   1. Pre-installation meetings and mock-up review meetings.
   2. Quality management reviews of installations before they are covered.
   3. Owner provided equipment as designated by the contract documents.
   4. Work by others as designated by the contract documents.
   5. Critical submittal dates.

E. The GC shall update the LOS prior to each bi-weekly progress meeting to indicate the next 6 weeks of scheduled work. Updates will be briefed during each bi-weekly progress meeting.

3.3. PROJECT MANAGEMENT WEB SITE (PMWS)

A. The GC shall upload all project schedules and updates to the PMWS in an original PDF version of the scheduling document. Scans will not be permitted.

END OF SECTION

SECTION 01 32 19
SUBMITTALS SCHEDULE

PART 1 – GENERAL

1.1. SUMMARY

A. The General Contractor shall submit a complete and comprehensive list of all submittals anticipated during the execution of this contract.

B. The GC shall include the Administrative submittals identified in item 1.5 below and shall be required to up load them to the Project Management Web Site.

C. The initial Submittals Schedule shall be based on the original contract documents used at the time of bidding and any posted addenda through awarding of the contract.

D. The Submittal Schedule may be appended during the execution of the contract based on amendments to the contract in the form of Change Orders, Construction Bulletins, and other related documents that add, or change the scope of the work.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 33 23 Submittals
D. Section 01 91 00 Commissioning

1.3. RELATED DOCUMENTS

A. The following documents shall be used as the basis for initiating the original Submittals Schedule.
   1. Drawing documents and specifications (including general provisions) as provided with the bid set documents and any published addenda.

B. The following documents shall be used to amend the submittals schedule as needed during the execution of this contract.
   1. Documents associated with revisions or clarifications to number A.1 above after awarding of the contract, including but not limited to:
      a. Construction Bulletins
      b. Approved Change Orders

1.4. SUBMITTAL DEFINITIONS

A. Administrative Submittal: Any submittal that may be required by a Division 1 Specification and as noted in Section 1.5 below.

B. Critical Path Submittal: Any early submittal that needs a priority review due to early construction use or long lead times where a delay could affect the critical path of the construction schedule

C. Submittal: Any material, product, equipment, or general requirement as outlined in this and other specifications that require a favorable review or acceptance prior to proceeding with procuring the item or proceeding with the Work.

1.5. SUBMITTAL REQUIREMENTS

A. The GC and all Sub-contractors shall review the construction documents including the specifications of their individual Division or Trade to compile a complete list of all materials, products, or equipment that will require a positively reviewed submittal to be completed prior to procurement and installation.
   1. Submittals shall include but not be limited to any of the following that may apply:
      a. Shop Drawings
      b. Product Data
      c. Assembly Drawings
      d. Engineered Drawings
      e. Product Samples

B. The following items will require an approved submittal, verify with specifications for specific needs and requirements:
   1. Contractor certifications for specialized work such as asbestos removal, well drilling, controls, AV, etc.

1.6. ADMINISTRATIVE SUBMITTALS

A. The GC shall upload the following submittals within 15 working days of receipt of the City of Madison Start Work Letter. All Administrative Submittals shall be approved prior to requesting Progress Payment Number 1.
   1. Contractors Project Directory, see specification 01 31 23, discuss requirements with CPM
   2. Schedule of Values, see Specification 01 29 73
   3. Submittals Schedule, see Specification 01 32 19
   4. Waste Management Plan, see Specification 01 74 19
   5. Closeout Requirement Checklist, see Specification 01 77 00
   6. Warranty Checklist, see Specification 01 78 36

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. OVERALL RESPONSIBILITIES OF ALL CONTRACTORS

A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work to provide a complete and comprehensive list of submittals to the General Contractor.

B. Each list shall indicate the title of the submittal, the associated specification of the submittal, whether the submittal can be considered an early/middle/late submittal, the anticipated date the submittal will be provided and the anticipated date the submittal needs to be approved.

C. Contractors shall be aware that the goals for submittal review by the Architect staff and City staff will be as follows:
   1. For items on the Critical Path as identified by the GC, five (5) working days
   2. For most other submittals ten (10) working days
   3. Additional time may be needed for complex submittals or if re-submittals are required.

D. The general format of the Submittal Schedule shall be tabular as per this example:

Title	Specification	Critical Path (Y or N)	Date provided	Date required	Remarks
Concrete Mix Design	03 30 00	Y	Oct 1, 2014	Oct 15, 2014	
Paint Draw Downs	09 90 00	N	Jan 2, 2015	Jan 20, 2015	

3.2. GENERAL CONTRACTORS RESPONSIBILITIES

A. The General Contractor shall be responsible for all of the following:
   1. Consolidating all submittal lists from individual contractors into one master list.
   2. Reviewing all submitted lists for completeness, timing with the overall contract, etc. The GC shall meet with individual contractors to make changes as necessary.
   3. Upload the completed Submittals Schedule to the Submittal Library on the Project Management Web Site for review as SD 003.0. See Specification 01 33 23 Submittals for more information on this procedure.
   4. Resubmit the schedule as needed after initial reviews have been completed.

B. The GC shall work with other contractors to amend the Submittals Schedule throughout the execution of the project based on changes and modifications as needed.

C. The GC and Project Architect shall be responsible for reviewing and briefing the submittal schedule and submittals status at each bi-weekly construction meeting.

3.3. STAFF REVIEW RESPONSIBILITIES

A. The Project Architect, consulting staff, Commissioning Agent (CxA), Owner, and city staff will review the Submittal Schedule for completeness per the plans and specifications within their divisions of work. The reviewing staff may provide comments as needed. Some examples might include the following:
   1. Submittal not required
   2. Provide photos of samples with digital submittal
   3. Insure one submittal for complete system
   4. Append the schedule to include…
   5. See Specification <xyz> for additional requirements

B. The Project Architect and City Project Manager will finalize review comments regarding the Submittal Schedule. Re-submittal of the submittal schedule may be required.

END OF SECTION

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SECTION 01 32 26
CONSTRUCTION PROGRESS REPORTING

PART 1 – GENERAL

1.1. SUMMARY

A. Daily records of project activities, resources used, weather conditions, and other information related to the ongoing progress of the project are extremely important at all levels of Construction Management.

B. Daily records provide the base for weekly progress reports and updating progress schedules.

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 31 19 Project Meetings

B. Section 01 31 23 Project Management Web Site

C. Section 01 32 23 Photographic Documentation

1.3. PERFORMANCE AND QUALITY ASSURANCE REQUIREMENTS

A. The General Contractor (GC) shall be responsible for all Construction Progress Reporting as outlined in this and other specifications as noted.

B. The GC shall maintain daily progress journals in a format of his/her choosing provided it is legible and contains the information as outlined in Section3.1 below.

C. The journal shall be located in the job trailer and shall be reviewable by the Project Architect or City Project Manager if so requested.

PART 2 – PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. DAILY PROGRESS JOURNAL

A. The GC shall maintain a daily progress journal of daily Work activities for each day on which Work is performed by any employee or entity for which the GC is responsible. Such reports shall include all relevant data concerning the progress of Work activities the GC and Subcontractors are responsible for and the effect of that activity on the time of performance of the Contract.

B. Journal entries shall be made on the Daily Work Report Form located in the Construction Progress-Daily Journal Library on the Project Management Web Site. The form consists of the following areas:

1. Weather; include temperature, humidity, precipitation, wind and other related information such as significant storm events, times, and details.
2. Work completed by trade
3. Delays encountered
4. Deliveries received or delayed
5. Hot issues that need to be addressed
6. Safety issues
7. Photograph progress and upload to the Photo Library on the Project Management Web Site.
8. Other including inspections, testing, etc.
9. Space for attaching documents

C. Daily Work activity reports shall be completed and signed by the GC's Job Superintendent or other on-site representative authorized by the GC confirming each such report is current, accurate and complete.

D. If applicable the GC shall include schedules of quantities and costs, progress schedules, wage rates, reports, estimates, invoices, records and other data as requested by the CPM concerning Work performed or to be

performed under this Contract if the CPM determines such information is needed to substantiate Change Order proposals, claims, or to resolve disputes.

3.2. CONSTRUCTION PROGRESS MEETINGS

A. The GC shall provide a verbal summary of the previous two (2) weeks progress reports at each bi-weekly construction progress meeting.

END OF SECTION

SECTION 01 32 33
PHOTOGRAPHIC DOCUMENTATION

PART 1 – GENERAL

1.1. SCOPE

A. The General Contractor (GC) shall be required to take weekly digital photographs of construction progress and upload the photos directly to the Project Management Web Site (PMWS).

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 31 23 Project Management Web Site
B. Section 01 32 26 Construction Progress Reporting

PART 2 – PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. REQUIREMENTS FOR DIGITAL PHOTOGRAPHS

A. All digital photographs shall be taken with a good quality digital camera, cell phone, tablet, and other such digital device.
B. Digital photographs shall be properly zoomed in/out to capture a specific level of detail as necessary.
C. Digital photographs shall be formatted to achieve a good, clear, and detailed image where the final file size is between 600 KB and 1.2 MB (1200KB).
D. The camera default naming convention is acceptable. The GC does not need to rename or specifically identify pictures in the title.
E. All digital photographs shall be saved in a JPEG (.jpg) format and uploaded directly to the PMWS.

3.2. PICTURE CONTENT

A. The GC shall take exterior photographs from at least two (2) different angles.
   1. This requirement shall only be applicable when there is exterior work connected with the project.
   2. When applicable this requirement shall begin prior to commencing any site work.
   3. This requirement shall end when the exterior work has been substantially completed.
   4. This requirement may be suspended due to weather conditions or substantial delays in exterior progress.
B. The GC shall take interior photographs of interior construction, equipment installation, rough-ins and other such progress that helps document weekly progress reporting. Interior photographs should focus on specific significant installations as well as general progress throughout the progress of the contract.

3.3. PROJECT MANAGEMENT WEB SITE

A. The GC shall upload the digital photographs to the appropriate progress folder in the Project Images Library.
B. Progress folders are labeled with the Construction Week Number and the date for Monday of that week.
C. The GC shall notify the City of Madison Project Manager if additional progress folders need to be created.

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SECTION 01 33 23
SUBMITTALS

PART 1 – GENERAL

1.1. SUMMARY

A. The General Contractor (GC) shall be responsible for providing submittals for review of all contractors and sub-contractors as designated in the construction documents. Submittals shall include but not be limited to all of the following:
   1. Equipment specified and pre-approved in the specification; to ensure quality, construction, and performance specifications have not changed since final design.
   2. Equipment specified by performance in the specification; to ensure that the intended quality, construction, and performance specified is met by the selected material or product.
   3. Shop, piece, erection, and other such drawings as indicated in the specifications to ensure all structural, dimensional, and assembly requirements are being met.
   4. Submittals indicating installation sequencing
   5. Submittals indicating control sequencing
   6. Contractor licensing, certification, and other such regulatory documentation when required by a specification.
   7. Other submittals as may be required by individual specifications.

B. The submittal process shall not be used to determine alternates to specified products or equipment. All considerations shall be reviewed during the bidding process and acceptable alternates shall be acknowledged by addendum prior to the closing of bidding. See bidding instructions for the information on submitting alternates for consideration.

D. In the event that a manufacturer has significantly changed a product (discontinued a model, changed dimension or performance data changed available colors, etc.) since bid opening the GC shall submit a Request for Information (RFI) to the Project Architect requesting other approved alternates prior to uploading a digital submittal.

E. Contractors and sub-contractors shall be responsible for knowing the submittal requirements of ALL sections within their scope of work under the contract. The Owner reserves the right to request documentation on any materials, equipment, or product being installed where a submittal is not on file. If the material, equipment, or product installed is determined not to meet the intent of the specification the contractor/sub-contractor shall be required to remove and replace the items involved. The GC shall be solely responsible for all costs associated with the removal and replacement.

1.2. RELATED REFERENCES

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 32 19 Submittals Schedule
D. Section 01 32 26 Construction Progress Reporting
E. Section 01 91 00 Commissioning
F. All Technical Specifications, contract documents, construction drawings, and any published addendums during the bidding process.
G. All contract documents generated during the execution of the contract including but not limited to Requests for Information (RFI) and Construction Bulletins (CB).

1.3. SUBMITTAL REQUIREMENTS

A. A completed submittal shall meet the following requirements:

1. Digital submittal shall be original PDF of manufacturer's data sheets or high quality color scan of the same.
    a. Submittals shall not include sales fliers or other similar documents that typically do not provide complete manufacturers data.
2. Documents within the PDF submittal shall be printable to a sized sheet no less than 8-1/2 by 11 inches and no larger than 24 by 36 inches.
3. At the beginning of each submittal the contractor shall identify the plan reference (WC-1, EF-3, etc.) in RED block letters that the submittal is for.
4. Where multiple model numbers appear in a table the contractor shall identify the specific model being submitted by using a RED square, box, or other designation to distinguish the correct model from others on the page.

B. A complete submittal will include all information associated with the product or equipment as presented in plans, equipment tables, and specifications. Information shall include but not be limited to the following:
1. Dimensional data
2. Performance data
3. Resource requirements, power, water, waste, etc
4. Clearance and maintenance requirements
5. Finish information, colors, textures, etc.
6. Warranty information

C. Where a submittal includes material samples (carpet, tile, paint draw downs, etc.) the contractor shall do the following:
1. The Contractor shall submit the sample(s) as indicated in the specification.
2. The Contractor shall include a quality photograph(s) of the product with the digital submittal. Photographs shall meet the following requirements:
    a. Formatted to be between 500Kb and 1.0 Mb in file size
    b. Have no glare or flash reflection on the sample
    c. Sample fills the frame of the photo and shows detail as needed. Include multiple photos from other angles as needed.
    d. Scanned copies of products or photos are not acceptable.

D. Uploaded submittals should be relative and related to a specific written specification.
1. Do not upload submittals under a broad category or division (I.E. HVAC 23 00 00). Always upload by the specific specification that identifies a required product or performance to be met.
2. Group related items together if the specification is written that way. (I.E. all of the plumbing fixtures and trim relative to one specific specification should be submitted together).
3. Submittals shall be grouped and adhere to the divisions in the submittal schedule. Submittals that do not conform to the submittal schedule and/or specification divisions will be rejected for re-submittal.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL CONTRACTORS PROCEDURES

A. All required submittals will be uploaded to the Construction Administration-Submittal Drawings Library on the Project Management Web Site (PMWS) by the GC.
1. The GC shall open a new Submittal Form in the Submittals Drawings Library for each required submittal from the Submittals schedule.
2. Fill in required information on the form that will be used for routing the review and comments.
3. Attach all documentation as described in Section 1.3 above.
    a. Submit samples under separate cover to the Project Architect when necessary.

B. Uploading the submittal indicates that the GC has reviewed and approved the submittal against the contract document requirements.

C. The GC shall discuss submittal status at all progress meetings and shall monitor submittal review/approval/re-submittal so as to not incur delays in the project schedule.

D. A completed upload of the submittal to the PMWS initiates the review process workflow.

E. The GC and sub-contractors shall provide re-submittals as required.

3.2. SUBMITTAL REVIEW

A. Upon completion of the submittal upload by the GC the PMWS automatically notifies the appropriate Architect/Engineer and Owner Representative, including CxA, by Division/Specification number that there is a submittal for review.

B. The submittal shall be reviewed internally by the required Architect/Engineer and Owner Representative and CxA in a timely fashion and provide commentary on missing items, incorrect information, or incomplete shop drawings, etc as needed.

C. When the internal review is completed the PMWS will notify the Project Architect the submittal is ready for final review.

3.3. PROJECT ARCHITECTS REVIEW

A. Upon completion of the internal review the Project Architect shall review all internal review comments, confer with the CPM and CxA as needed and determine the appropriate disposition status for the submittal (approved or resubmit).

C. The Project Architect shall summarize final internal review comments onto the submittal cover sheet, provide a final disposition of the submittal and update the review status of the submittal to “Complete…” (with or w/o comments) or “Rejected”.

D. A completed Final Review status initiates the PMWS to notify the GC and appropriate sub-contractor(s) that the review of the submittal has been completed.

END OF SECTION

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SECTION 01 43 39
MOCKUPS

PART 1 – GENERAL

1.1. SUMMARY

A. Definition
   1. Mockups are field samples constructed, applied, or assembled at the project site for review by the Owner, Owners Representative, Architect and Consultants.
   2. Mockups are three dimensional, true scale models that illustrate materials and methods, equipment, workmanship, or location; based on plans, details, and assemblies.

B. Approved mockups establish the standard of quality by which the final work will be judged.

C. Approved mockups shall be properly documented and entered Into the Submittal Library on the Project Management Web Site like any other required submittal. See section 3.4 below for more information.

1.2. RELATED SPECIFICATIONS

A.	Section 01 26 13	Request for Information (RFI)
B.	Section 01 26 46	Change Bulletin (CB)
C.	Section 01 26 63	Change Order (CO)
D.	Section 01 31 19	Project Meetings
E.	Section 01 32 16	Construction Progress Schedules
F.	Section 01 33 23	Submittals
G.	Section 01 45 00	Quality Control

1.3. RELATED DOCUMENTS

A. The following documents shall be used for preparing mockups.
   1. All plans, specifications, and details including those derived as revisions (RFI, CB, CO).
   2. Construction Progress Schedules. Mockups shall be done and completed in a timely fashion for review and approval so as to not impact the Contractors project schedule.
   3. Any Manufacturers installation/assembly instructions.

1.4. PERFORMANCE REQUIREMENTS

A. All Contractors shall be responsible for providing and constructing mockups as specified in their Division of Work in the plans and specifications.

B. Materials to be used shall be as specified in the construction documents, full sized and properly assembled.

C. Completed mockups shall be of sufficient size to provide visible detail of all components as needed for the sample.

1.5. QUALITY ASSURANCE

A. The General Contractor (GC) shall be responsible for coordinating all of the following as needed:
   1. Designating the location for the mockup construction
   2. Coordinating the work of all contractors and materials required to complete the mockup
   3. Ensuring that the mockup meets the intent of the construction documents before scheduling the mockup review meeting.

PART 2 - PRODUCTS

2.1. MATERIALS

A. The materials used in mockups shall be only those materials indicated in the plans, specifications, and favorably reviewed submittals.

B. Mockups shall be made of full scale materials as delivered to the project site.

C. All materials associated with a particular detail, construction method, manufacturer's installation instructions shall be properly represented and visible in the mockup. This includes but is not limited to finished mortar joints, sealants, backer rods, tie bars, rebar, etc.

PART 3 - EXECUTION

3.1. REVIEW THE PLANS AND SPECIFICATIONS

A. The GC shall review the plans and specifications with all required contractors prior to constructing the mockup.

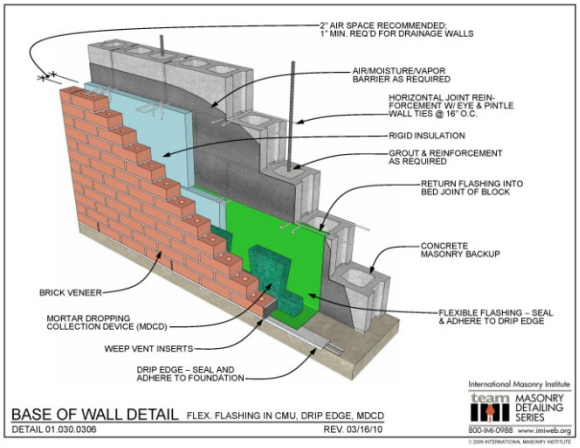
1. Mockups that will be built and remain in place, if favorably reviewed, will be installed in an area easily accessible for review.
2. Mockups that will not be built in place or will not remain will be constructed in a space on the project site protected from weather, construction traffic, and other such disturbances until such time as the associated work has been completed.
3. Insure all products being represented in the mockup meet the plans, specifications, and any published changes.

3.2. MOCKUP CONSTRUCTION

A. Mockups shall be of sufficient size to show various material adjacencies, connectivity, patterns, and other such related features.

B. Mockups shall be constructed in a layered fashion so that all products being used can be seen and evaluated.

C. The construction detail below is an example of a properly layered mockup.



d. Mockups shall be constructed for all cavity wall construction and all hidden elements of construction.

3.3. MOCKUP REVIEW

A. The General Contractor and all associated Sub-contractors (Contracting Team) shall meet with the Owner, Owners Representative, Architect and Consultants (Design Team) as necessary to review the mock-up. Contractors shall be prepared to answer questions on materials and methods as necessary.

B. The Contracting and Design Teams shall review the mockup in detail for materials, methods, and workmanship with respect to the intent of the contract documents. Improvements or adjustments shall be discussed as needed.

C. If the mockup is incomplete or does not show sufficient detail of products and workmanship the General Contractor shall resubmit a new mockup.

D. Re-submittal of mockups to meet the intent of the contract documents shall be the responsibility of the General Contractor. No Change Orders will be processed for additional time or materials associated with re-submitting a mockup for approval.
   1. In the event that a submitted mockup meets the criteria of the contract documents but does not meet the expectations of the design team and alternative methods or materials are discussed the following procedure shall be used:
      a. Project Architect shall publish a Construction Bulletin (CB) to detail the required/recommended changes.
      b. The GC shall prepare and submit a new mockup.

3.4. FINAL SUBMITTAL

A. The field approved mockup shall be submitted by the General Contractor as any other submittal for project documentation purposes. The mockup submittal shall consist of the following:
   1. Digitally photograph the field approved mockup. Take as many detailed photos as necessary to capture the complexity of the mockup.
   2. Provide a written summary of the approved mockup. Include all recommended adjustments, level of expected workmanship, and other such detail as discussed during the mockup review.
   3. Submit the mockup to the Project Management Web Site. See Specification 01 33 23 Submittals for additional information.

END OF SECTION

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SECTION 01 45 16
FIELD QUALITY CONTROL PROCEDURES

PART 1 – GENERAL

1.1. SUMMARY

A. The City of Madison has developed a multi-faceted Quality Management Program that begins with contract signing and runs through contract closeout to ensure the best quality materials, workmanship, and product are delivered for the contracted Work.
   1. The Progress Management Web Site is a Construction Management tool that provides contractors and staff a single on-line location for the daily operations and progression of the Work.
   2. The Quality Management Observation (QMO) is an ongoing observation of the construction process as it progresses. The City of Madison does not use a "Punch List" or "Corrections List" as it is typically known throughout the construction industry. The QMO process acts as an "in progress punch list".
      a. By using the QMO process the City of Madison's goal is to have a zero item punch list prior to the 90% progress payment and owner occupancy.

B. All contractors shall be required to review the specifications identified in Section 1.2 below, and other related specifications identified therein to become familiar with the terminology and expectations of this City of Madison Public Works contract.

C. It is the intent of this specification to outline the requirements, expectations, and responsibilities of the General Contractor (GC), Project Architect, and other representatives of the Owner for items of Quality Assurance and Quality Control.
   1. This specification is not intended to conflict with Specification 01 40 00 Quality Requirements or other specifications requiring testing and inspecting services.
   2. This specification does not relieve the GC from any requirements associated with regulatory inspections performed by the City of Madison Building Inspection Unit, or inspectors from other agencies as required by code.
   3. Any testing performed by an Owner's Representative does not relieve the GC from performing any testing that may required by the construction documents.

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 26 13 Request for Information (RFI)
B. Section 01 29 76 Progress Payment Procedures
C. Section 01 31 13 Project Coordination
D. Section 01 31 23 Project Management Web Site
E. Section 01 40 00 Quality Requirements
F. Section 01 77 00 Closeout Procedures
G. Section 01 78 13 Completion and Correction List
H. Section 01 91 00 Commissioning

1.3. PERFORMANCE REQUIREMENTS

A. All contractors shall be responsible for a proper quality assurance/quality control (QA/QC) program throughout the execution of the Work defined within the construction documents, including all recognized construction industry standards and all applicable regulatory codes.

B. The GC shall be responsible for all of the following:
   1. Monitor the quality of all workmanship, supplies, materials, and products being installed by all contractors and installers to ensure they meet or exceed the minimum requirements set forth by the construction documents.
   2. Submit a Request for Information (RFI) whenever manufacturers' instructions or referenced standards conflict with the construction documents before proceeding with the Work.
   3. Ensure that Work requiring special certifications or licensing is being performed by is being performed and supervised by personnel that meet the appropriate requirements.
      a. Ensure that all certificates and licenses are current throughout the execution of the project.

C. The CoM and its representatives shall perform quality assurance and quality control activities throughout the execution of this project. This in no way relieves the GC of maintaining an acceptable QA/QC program. =

1.4. QUALITY ASSURANCE

A. The GC shall be responsible for the following:
   1. All materials, equipment, and products shall be new, clean, undamaged, and meet the performance specifications defined within the construction documents including favorably reviewed submittals.
      a. Any material, equipment, or product that does not meet the requirements of the construction documents shall be removed and replaced, including any adjacent and related work, at the GCs expense.
   2. All Work shall be performed by persons properly trained and/or qualified to produce workmanship of the quality specified in the construction documents.
   3. Providing access to updated as-builts, addenda, submittals, bulletins and other related construction documents at the project site.

B. The CoM and its representatives may be responsible for any of the following:
   1. Attend pre-installation meetings
   2. Attend construction progress meetings
   3. Review all submittals
   4. Conduct field visits for QA/QC purposes, provide feedback to the GC and sub-contractors using Quality Management Observation (QMO) reports.
   5. Review delivered equipment
   6. Witness equipment installations, startups, testing as specified in other specifications

1.5. QUALITY MANAGEMENT OBSERVATION REPORT

A. The Quality Management Observation report or QMO is used as a QA/QC tool by those entities responsible for QA/QC activities, including but not limited to, the GC, CoM, PA, CX agent, etc.

B. QMOs are designed to be an early observation of non-conforming construction work before it becomes buried by follow on work. As such it is most often used as an "in progress punch list".

C. QMO forms are part of the Quality Control Library on the Project Management Web Site.

PART 2 – PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. QUALITY MANAGEMENT RESPONSIBILITIES

A. While making routine progress visits to the construction project the GC, CPM, CxA and A/E, and applicable others shall observe the details of the construction and installations to ensure that the intent of the construction documents is being followed.

B. If during the progress visit there is a determination of contract non-conformance a QMO report shall be initiated to begin the documentation process.
   1. The GC field superintendent shall be informed immediately of any issue that may cause harm, damage to finished work, or be buried prior to properly filing a QMO report.

C. The following information when filing a QMO report:
   1. Open a QMO report in the Quality Control Library on the Project Management Web Site
   2. Enter the date and time of the field visit
   2. Provide references to construction documents if any (examples; specification, drawing page, details, approved submittals, RFI, CB, etc)
   3. Provide a short title for the observation being made
   4. Provide a detailed description of the observation being made

5. Select all categories (Sitework, Structure, Enclosure, Interior, etc) from the given list that may apply to the observation being reported.
    a. For each category selected additional boxes shall open with contractor names associated with each category.
6. Select all contractors from the lists provided that may need to be aware of the observation.
7. Provide any attachments that may help provide reference to the observation.
8. Click the SAVE button before closing the form.

D. The software for the Project Management Website will email notifications that a QMO report has been initiated. The software will automatically select and notify the following:
1. The GC, PA, and CPM for all observation reports being filed.
2. Others depending on the observation categories selected.
3. Contractors based on the selections made in the sub-contractors lists.

3.2. RESPONDING TO A QMO

A. All contractors receiving email notification of a QMO Observation shall review the details of the observation.
B. The GC shall be responsible for determining the course of action required to remedy the non-conforming issue and shall coordinate and direct the contractor(s) responsible for any work related to the observation.
C. All contractors assigned to remedy the observation by the GC shall provide follow-up responses on the QMO report as follows:
1. Open the QMO report in the Quality Control Library on the Project Management Web Site.
2. In the "Follow-Up Response" area enter a description of your follow-up response in the box provided.
    a. Click "Insert Item" if additional boxes are required.
3. Add attachments (pictures) if needed to show the work has been completed.
4. Click the SAVE button before closing the form.

3.3. GENERAL CONTRACTORS FOLLOW-UP

A. The GC shall inspect the work to ensure that all assigned contractors have remedied the observation to the intent of the construction documents.
B. The GC shall respond with any additional comments in his/her response box.
1. If no comments are to be made the GC at a minimum must date the response box to trigger the next work flow.
C. Click the SAVE button before closing the form.
D. The software will email a notification to the CPM and the person who initiated the QMO that the issue has been remedied.

3.4. QMO CLOSEOUT PROCEDURE

A. The person who initiated the QMO shall review the remedied work and if properly corrected shall close and date the QMO form.
1. Click SAVE and the software will email a notification to the CPM that final review of the Observation is required.
2. In the event there are still issues the Quality Manager can add additional comments in the response area, click SAVE and re-issue the QMO for additional review as needed.
B. Once the person who initiated the QMO has closed the item the CPM shall review and verify with the PA that the Observation has been properly remedied and provide final closure on the QMO.

3.5. CONSTRUCTION CLOSEOUT

A. The GC shall note that successful close out QMOs are required for construction closeout as follows:
1. Certain progress payments as identified in Specification 01 29 76 are contingent QMO reports being properly closed out.
2. Specification 01 77 00 defines all construction closeout requirements.

END OF SECTION

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 – GENERAL

1.1. REQUIREMENTS INCLUDED

A. The Contractor shall employ and pay for the services of an independent testing laboratory to perform specified services and testing.

B. Testing Laboratory inspection, sampling and testing is required for:

1. Section 03 30 00: Cast-In-Place Concrete
2. Section 05 12 00: Structural Steel Framing
3. Section 05 40 00: Cold-Formed Steel Framing
4. Section 31 20 00: Earthwork

1.2. RELATED REQUIREMENTS

A. Conditions of the Contract: Inspections and testing required by laws, ordinances, rules, regulations, orders or approvals of public authorities.

B. Related Requirements Specified in Other Sections:

1. Division 22 and 23: Testing of Mechanical Systems
2. Division 26: Testing of Electrical Systems

1.3. QUALIFICATION OF LABORATORY

A. Meet "Recommended Requirements of Independent Laboratory Qualification" published by American Council of Independent Laboratories.

B. Meet basic requirements of ASTM E 329, "Standards of Recommended Practice for Inspection and Testing Agencies for Concrete and Steel as Used in Construction."

C. Authorized to operate in State in which the Project is located.

1.4. LABORATORY DUTIES

A. Cooperate with Owner, A/E and Contractor; provide qualified personnel after due notice.

B. Perform specified inspections, sampling and testing of materials and methods of construction:

1. Comply with specified standards.
2. Ascertain compliance of materials with requirements of Contract Documents.

C. Promptly notify the Owner, A/E and Contractor of observed irregularities or deficiencies of work or products.

D. Promptly submit written report of each test and inspection; one copy each to A/E, Consulting Engineer, Owner and Contractor. Each report shall include:

1. Date issued.
2. Project Title and number.
3. Testing laboratory name, address and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling or inspection.
6. Record of temperature and weather conditions.
7. Date of test.
8. Identification of product and specification section.
9. Location of sample or test in the Project.
10. Type of inspection or test.
11. Results of tests and compliance with Contract Documents.

12. Interpretation of test results, when requested by A/E or the Contractor.

E. Perform additional tests as required by Owner, A/E or the Contractor.

1.5. LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:
1. Release, revoke, alter, or enlarge on requirements of Contract Documents.
2. Approve or accept any portions of the Work other than those portions of the Work scheduled for testing.
3. Perform any duties of the Contractor.

1.6. CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel, provide access to Work and to manufacturer's operations.

B. Secure and deliver to the laboratory, adequate quantities of representative samples of materials proposed to be used and which require testing. Submit concrete mix designs to A/E for approval prior to pouring concrete.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes that require control by the testing laboratory.

D. Furnish copies of Product test reports as required.

E. Furnish incidental labor and facilities:
1. To provide access to Work to be tested.
2. To obtain and handle samples at the Project site or at the source of the product to be tested.
3. To facilitate inspections and tests.
4. For storage and curing of test samples.

F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

G. Make arrangements with laboratory and pay for additional samples and tests required for Contractor's convenience.

H. Employ and pay for the services of a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required when initial tests indicate work does not comply with Contract Documents.

I. Temporarily halt the progress of the Work when tested materials do not comply with Contract Documents and promptly notify the Owner or his designated representative and A/E.

J. Remove and replace at no cost to the Owner, all defective materials discovered upon testing not to comply with Contract Documents, including cost for retesting and re-inspecting replaced Work that failed to comply with the Contract Documents.

1.7. SPECIFIC TEST, INSPECTIONS, AND METHODS REQUIRED

A. **Section 03 30 00: Cast-In-Place Concrete**
1. Secure sample of aggregates Contractor proposes to use and test for compliance with Specifications.
2. Certify compliance with Specifications of cement proposed for use by the Contractor.
3. Review and approve the Contractor's proposed concrete mix proportions for the required concrete strengths using materials Contractor proposed to use on the project. Incorporate specified admixtures and not less than amounts of cement specified.
4. Perform appropriate laboratory tests, including compression tests of cylinders and slump test to substantiate mix designs.
5. Inspect and test materials during concrete work to substantiate compliance with Specifications and mix requirements.
a. Testing:
i. Sample and test concrete in accordance with ASTM C 31, ASTM C 143, ASTM C 172, and ASTM C 231.
ii. Perform slump tests in accord with ASTM C 143 from same concrete batch used for test cylinders and record results and comments on compression test reports.
iii. Perform compression tests in accordance with ASTM C39.
iv. When air-entrained concrete is used, a minimum of one (1) air content test shall be performed in accordance with ASTM C 231 for each set of test cylinders taken.
v. Identify all test cylinders with symbols to indicate location on the job where concrete test was made. Record on project record drawings.
vi. Strength tests shall be made for: each day's pour; each class of concrete; each change of supplies or sources; and for each 100 cubic yards of concrete or fraction thereof.

vii. One slump test shall be made for each set of test cylinders taken following the procedure in ASTM C 143.

b. Test Cylinders for all Concrete

i. Each test shall consist of a minimum of four cylinders.

ii. Make test cylinders in conformity with ASTM C 31.

iii. After 24 hours three cylinders to be carefully transported to the testing laboratory for moisture curing and one cylinder to be field cured.

iv. One field cured cylinder to be tested at 7 days and two laboratory cured cylinders to be tested at 28 days. Reserve one cylinder for further testing.

v. The average of all strength tests representing each class of concrete, as well as the average of any three consecutive strength tests for each class of concrete, shall be equal to or greater than the specified strength.

vi. If the A/E has reason to believe that cylinder strength tests are not representative of the strength of concrete in place, A/E shall require drilled cores to be cut and tested at the Contractor's expense. Coring and testing shall be in accordance with ASTM C 42 Standard Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

B. **Section 05 12 00: Structural Steel Framing**

1. Welding:

a. Provide inspection of shop and field welding in accordance with Section 6 of AWS D1.1.

b. Visually inspect all welds, perform appropriate non-destructive tests on apparent defective welds. Verify conformance with Specifications.

c. Non-destructive testing shall be performed on 20 percent of the total length of all full penetration welds. If a sufficient number of welds are deficient, additional testing may be performed at the discretion of the testing lab, at no cost to Owner.

2. Bolting:

a. Visually inspect all connections for proper number, size and type of bolt.

b. Review all bolted connections for compliance with "snug tight" requirements of AISC.

c. No Slip-critical (SC) connections/bolts are required for this project.

d. Shear Connectors, Headed/Deformed Bar Concrete Anchors:

i. Verify pre-production test records for installation of shear connectors, concrete anchors and threaded studs.

ii. Shear connectors shall be struck with a hammer. Those not producing a "clean" pinging sound indicative of a fully attached shear connector shall be bent 15 degrees off vertical towards the nearest support by striking with a hammer. If shear connector does not become loose and weld is not broken, it shall be considered acceptable, and shall be left in the bent position. Replace failing shear connectors and test as before.

iii. A visual inspection shall be made of shear connectors and headed/deformed bar concrete anchors after installation. If visual inspection reveals that a sound weld and a 360 degree flash has not been obtained, the connector/anchor shall also be tested by bending a minimum of 15 degrees off vertical opposite to the missing weld/flash, irrespective of the results of the "ping" test required for shear connectors. If the connector/anchor does not become loose it shall be considered acceptable and shall be left in this position. Replace failing connector/anchors and inspect as before.

C. **Section 05 40 00: Cold Formed Steel Framing**

1. As directed by A/E, Contractor's testing agency may inspect the maintenance of a quality control program including spot checking weldments and welding procedures in accordance with AWS standards.

D. **Section 31 20 00: Soil Compaction Control and Trenching and Backfilling**

1. Soils Engineer to be onsite during excavation operation.

2. Visually inspect, test, and certify that exposed undisturbed underlying soil is suitable for required footing bearing capacity and placement of fills.

3. Maximum and minimum density of fill soil for compaction percentage of relative density and moisture density shall be determined in accordance with ASTM Designation D 1557. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.

4. Number of tests as follows:

a. Subgrade, Undisturbed and Demolition Surfaces: Visual inspection and probe; test if required.

b. Interior Fills: One test per 2,500 sq. ft for each two foot or less lift.

c. Exterior Fills: One test per 2,500 sq. ft for each two foot or less lift.

d. Utility Trenches: One test per 50 lineal feet for each two foot or less lift.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.1. SUMMARY

A. This Section includes general procedural requirements for temporary facilities and controls including, but not limited to the following:
   1. Temporary Utilities
   2. Telecommunications Services
   3. Temporary Sanitary Facilities
   4. Barriers
   5. Fencing
   6. Exterior Enclosures
   7. Security
   8. Vehicular Access and Parking
   6. Waste Removal
   7. Project Identification
   8. Field Offices

1.2. RELATED SPECIFICATION SECTIONS

A. Section 01 31 19 Progress Meetings
B. Section 01 31 23 Project Management Web Site
C. Section 01 74 19 Construction Waste Management and Disposal

1.3. QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but not limited to:
   1. Building Code requirements
   2. Health and safety regulations
   3. Utility company regulations
   4. Police, Fire Department and Rescue Squad rules
   5. Environmental protection regulations
   6. Joint Commission - Hospital Accreditation Standards

B. Standards: Comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities".

C. Electrical Service: Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70 "National Electric Code".

1.4. TEMPORARY UTILITIES

A. Contractor will provide the following:
   1. Temporary electrical power and metering for construction.
   2. Temporary water supply for construction.
      a. Use trigger-operated nozzles for water hoses, to avoid waste of water.

B. Temporary Lighting: Electrical Contractor shall provide temporary lighting with local switching
   1. Install and operate temporary lighting, minimum of 30 fc, to fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for all areas of work, including construction operations and traffic conditions.

C. Temporary Heat: General Contractor shall provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.
   1. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas or fuel oil heaters with individual space thermostatic control.
      a. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

1.5. TELECOMMUNICATIONS SERVICES AND WI-FI

A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization through construction closeout.

B. Telecommunications services shall include:
   1. Windows-based personal computer dedicated to project telecommunications.
   2. Shared access to the internet via WIFI or similar wireless connection.
      a. Access must be capable to support minimum of 10 wireless devices.
   3. Email Account/address dedicated for GC Project Manager of GC Supervisor on site.

1.6. TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Temporary toilets: Comply with regulations and health codes for the type, number, location, operation, and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.
   1. Provide toilet tissue, paper towels, paper cups, and similar disposable materials foreach facility. Provide covered waste containers for used material.
   2. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy.

C. Maintain daily in clean and sanitary condition

D. Water: Provide potable water approved by local health authorities

1.7. 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 and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

1.8. FENCING

A. Construction: Refer to Plan Documents and Specification Section 01 76 00: Fencing Materials and Barricades

1.9. EXTERIOR ENCLOSURES

A. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.10. SECURITY

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

1.11. VEHICULAR ACCESS AND PARKING

A. Comply with regulations relating to use of streets and sidewalks, access to emergency facilities, and access for emergency vehicles.
B. Coordinate access and haul routes with governing authorities and Owner.
C. Provide and maintain access to fire hydrants, free of obstructions.

1.12. WASTE REMOVAL

A. See Section 01 74 19 - Waste Management, for additional requirements.
B. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
C. Provide containers with lids. Remove trash from site periodically.
D. 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.
E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

1.13. PROJECT IDENTIFICATION

A. Provide project identification sign of design and construction indicated in Section 01 58 13.
B. Erect on site at location determined by the City.
C. No other signs are allowed without City permission except those required by law.

1.14. FIELD OFFICES

A. Field Office: Weather tight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture, drawing rack and drawing display table.
B. Field Office shall be located on the project site.
C. Provide space for Project Meetings with table and chairs to accommodate a minimum of 15 persons.
D. Provide a minimum of a 40” LCD monitor or other digital projection device to be connected to the computer identified in Section 1.4 Telecommunications Services (above), for use during progress meetings in connection with reviewing construction progress information posted to the Project Management Web Site (Specification 01 31 23) hosted by the Owner.

PART 2 - PRODUCTS

2.1. TEMPORARY PARTITIONS

A. Provide dustproof partitions to limit dust and dirt migration and to separate occupied areas from fumes and noise.
    1. Non-fire rated partitions, standard
        a. Wood stud framing, 6-mil polyethylene

2.2. EQUIPMENT

A. Temporary Lifts and Hoists: Contractors requiring temporary lifts and hoists shall provide facilities for hoisting materials and employees.
B. Electrical Outlets: Electrical Contractor shall provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.
C. Electrical Power Cords: Contractors requiring power cords shall provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
D. Lamps and Light Fixtures: Electrical Contractor shall provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
E. Heating Units: General Contractor shall provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.
F. First Aid Supplies: General Contractor shall provide first aid supplies complying with governing regulations.

G. Fire Extinguishers: General Contractor shall provide hand-carried, portable UL-rated, fire extinguishers of NFPA recommended classes for the exposures, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1. TEMPORARY FIRE PROTECTION

A. Until fire protection needs are supplied by permanent facilities, General Contractor shall install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses.
B. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations".
C. Locate fire extinguishers where convenient and effective for their intended purpose.
D. Store combustible materials in containers in fire-safe locations.
E. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways and other access routes for fighting fires.
F. Prohibit smoking on the premises.
G. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
H. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site
I. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.2. COLLECTION AND DISPOSAL OF WASTE

A. Collect waste from construction areas and elsewhere daily
B. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly.
C. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F.
D. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

3.3. ENVIRONMENTAL PROTECTION

A. Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.
B. Avoid use of tools and equipment which produce harmful noise.
C. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.4. REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials prior to Substantial Completion inspection.
B. Remove underground installations to a minimum depth of 2 feet (600 mm). Grade the site as indicated.
C. Clean and repair damage caused by installation or use of temporary work.
D. Restore existing facilities used during construction to original condition.
E. Restore new permanent facilities used during construction to specified condition.

END OF SECTION

SECTION 01 58 13
TEMPORARY PROJECT SIGNAGE

PART 1 – GENERAL

1.1. SECTION INCLUDES
A. Project identification sign.

1.2. QUALITY ASSURANCE
A. Design sign and structure to withstand 50 miles/hr wind velocity.
B. Sign Painter: Experienced as a professional sign painter for minimum three years.
C. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

1.3. SUBMITTALS
A. See Section 01 30 00 – Administrative Requirements for submittal procedures.
B. Shop Drawing: Show content, layout, lettering, color, structure, sizes.

PART 2 - PRODUCTS

2.1. SIGN MATERIALS
A. Structure and Framing: New, wood, structurally adequate.
B. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum ¾" thick, standard large sizes to minimize joints.
C. Rough Hardware: Galvanized

2.2. PROJECT IDENTIFICATION SIGN
A. One painted sign, 32 sq ft area, bottom 6 feet above ground.
B. Content:
1. Project title, City of Madison, Police Department logo and name of Owner as indicated on Contract Documents.
2. Names and title of Architect.
3. Name of General Contractor and major subcontractors.
4. Full color project rendering from high resolution image as furnished by Architect.

PART 3 - EXECUTION

3.1. INSTALLATION
A. Install project identification sign within 30 days after date fixed by Notice to Proceed.
B. Erect at designated location.
C. Install sign surface plumb and level, with butt joints. Anchor securely.

3.2. REMOVAL
A. Remove sign, framing supports, and foundations at completion of Project and restore the area.

END OF SECTION

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SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide general guidelines and responsibilities related to the receiving, handling, and storage of all materials and products from arrival on the job site through installation.
   1. Immediate inspection of delivered goods means a timely replacement if damaged.
   2. Proper storage helps prevent damage and loss by weather, vandalism, theft, and job site accidents.
   3. Proper storage helps with job site performance and safety.
   2. Proper handling helps prevent damage and job site accidents.

B. Each Contractor shall be directly responsible for the receiving, handling, and storage of all materials and products associated with the Work of their Division or Trade.

C. Each Contractor responsible for Work associated with Owner provided materials or products shall be responsible for the receiving, handling and storage of the material/product as outlined in Section 3.8 below..

1.2. RELATED SPECIFICATIONS

A. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".
   1. Use the following link to access the Standard Specifications web page:
      http://www.cityofmadison.com/business/pw/specs.cfm
      a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
      b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.
      c. City Standard Detail Drawings (SDD) may be located from the index in Part VIII.

B. Section 01 57 21 Indoor Air Quality

C. Section 01 74 13 Progress Cleaning

D. Section 01 76 00 Protecting Installed Construction

E. Other Divisions and Specifications that may address more specifically the requirements for the storage and handling of materials and products associated Work of other Divisions or Trades.

1.3. QUALITY ASSURANCE

A. The GC shall be responsible for ensuring that these minimum storage and handling requirements are met by all contractors on the project site including but not limited to the following:
   1. Receiving deliveries of materials, products, and equipment.
      a. Inspect all deliveries upon arrival for damage, completeness, and compliance with the construction documents.
         i. Deliveries shall remain in original packaging or crates, shipping manifest shall be kept with the delivery and the packaging shall have visible identification of the items within the packaging.

b. Immediately report any damaged products or equipment to the GC, begin arrangements for immediate replacement.
c. Materials or equipment that have been damaged, are incomplete, or do not comply with the construction documents shall not be permitted to be installed.

2. All materials and products shall be stored within the designated limits of the project site. Only store the amount of material necessary for upcoming operations so as not to interfere with other construction activities and access to Work by the Owner and Architect. Any offsite storage shall be at the expense of the contractor storing the material or product. All offsite storage requirements shall comply with this specification. All offsite storage of materials is subject to Owner Representative Quality Management review at any time.
3. Large storage containers may be used but shall be weather tight, securable, placed on concrete blocks, timbers, or jack stands and shall be level.
4. When lifting equipment is required the equipment rating shall be greater than the loading requirements of the item being lifted. In addition all of the following shall apply as necessary:
   a. Only designated and/or designed lift points shall be used.
   b. Large items shall have tag lines and handlers at all times during lifting operations.
   c. Lift at multiple points as needed to prevent bending.
5. Materials and products stored inside of the structure shall comply with all of the following:
   a. Storage shall not be allowed to impede the flow of work in progress.
   b. Storage shall not be allowed to hide completed work from review and inspections.
   c. Storage shall not exceed the design loads of the structural components it is being stored upon.
6. All materials and products shall be stored according the manufacturers minimum recommended requirements. All of the following shall be considered before storing any product or material:
   a. Dust and dirt
   b. Moisture and humidity, including rain and snow
   c. Excessive temperatures, direct sun, etc
   d. Product or material weight and size
   e. Potential for breakage
   f. Product incompatibility with other products such as corrosiveness, chemical reactions, flammability, etc.
   g. Product or material value and replacement cost
7. The Contractor shall be responsible for providing fully functional tarps or plastic wrap, to protect materials and products from the weather. All coverings shall be free of large holes and tears, and shall be tied, strapped, or weighted down to resist blowing.
8. The Contractor shall be responsible for any temporary heating, cooling, or other utility requirement that may be associated with the storage of a material or product.
9. The Contractor shall be responsible for securing materials and products of value such as copper, A/V equipment, etc. Such items shall be stored in securable shipping containers, job trailers or other such storage devices. Container shall be kept secured when not in use.

B. The GC shall inspect the job site daily to ensure that all products and materials stay weather tight and are secured against vandalism or theft as required by this specification.
C. The Owners Representative may at any time request improvements regarding storage of any material or product being provided under these construction documents.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL CONTRACTOR REQUIREMENTS

A. Designate material storage and handling areas as needed including all of the following:
   1. Designate specific areas of the site for delivery and storage of materials to be used during the execution of the Work.
   2. Designated areas shall not be located so as to interfere with the installation of any Work including Work by others such as the installation of utilities or the maintenance of existing utilities. This shall include not storing items in active utility easements as designated by the site plan.
B. Arrange for openings in the building as needed to allow delivery and installation of large items. Openings shall be appropriately sized to include the use of booms, slings, and other such lifting devices that may be larger than the item being installed.

1. When openings are required in completed Work (new or existing) the GC shall be responsible for providing an appropriate opening and for restoring the opening to the original or better condition upon completion. Restoration shall be weather tight and complete.

C. Repeated moving and handling of items being stored shall not be allowed. The GC shall be responsible for any damage and replacement because of mishandling or excessive handling.

3.2. BULK MATERIAL

A. Bulk material such as sand, gravel, top soil and other types of fill shall be stored away from the construction area and shall be stock piled as follows:
1. All bulk material shall be piled safely and efficiently in as small an area as practical. Only store the amount of material necessary for upcoming operations so as not to interfere with other construction activities and access to Work by the Owner and Architect.
2. All stock piles shall have silt fence/sock properly installed around the perimeter to prevent erosion and loss of material. Refer to City of Madison Standard Specification Section 210.1(f) and other related specification or details.
3. Fine grained material shall be protected with tarps to prevent blowing. Tarps shall be weighted or staked to stay in place.

B. Bulk material such as brick, concrete block, stone, and other palletized materials shall be stored on original shipping pallets until ready for use.

3.3. DRY PACKAGED MATERIAL

A. Dry packaged material such as cement, mortar, etc shall be stored on pallets, on slightly elevated ground or clear stone pad to keep water away from the base of the material being stored. Protect from moisture.

3.4. STRUCTURAL AND FRAMING MATERIAL

A. All structural and framing material shall be stored in an organized manner arranged by type, size and dimension. Materials shall be stored on pallets or timbers as necessary and shall not be allowed to lie directly on the ground.

B. Long and heavy items shall be supported at several points to prevent bending and warping.

3.5. EQUIPMENT

A. Equipment delivered to the site shall be stored away from all construction activities until the item can either be moved inside or properly installed.

B. Equipment shall be stored on slightly elevated ground or clear stone pad to keep water away from the base of the equipment.

3.6. FINISH PRODUCTS

A. Finish products such as flooring, tile, counters, lockers, toilets, partitions, lighting, and other similar items should not be delivered and stored until the structure has been enclosed, is weather tight, temperature controlled and the contractor is ready for such items to be installed.
1. Storage of finished products outside for any length of time shall not be allowed.

B. Products that cannot be stored inside the structure shall be stored in secured containers or job trailers until such time as they are ready to be installed.

C. Products with a high potential for breakage such as glass, mirrors, tiles, toilet fixtures, etc. shall be stored with additional protection as necessary such as but not limited to the following:
1. Store in original shipping containers until ready for installation.
2. Do not store in high traffic areas.
3. Shield with other materials such as cardboard, plywood, or similar products.

3.7. DUCTWORK, PIPING, AND CONDUIT

A. All piping and conduit shall be stored horizontally unless otherwise specified by the manufacturer or Division and Trade Specifications.
1. Do not store directly on grade.
2. Cover metal pipes and tubes to prevent rust and corrosion, allow ventilation to prevent condensation.
3. Whenever possible use pipe stands for storing pipe and conduit to prevent tripping and rolling hazards.

B. All ductwork shall be stored horizontally or vertically as necessary unless otherwise specified by the manufacturer or Division and Trade Specifications.
1. During storage, both ends of each duct shall be protected with plastic sheathing to prevent dust and dirt from getting inside the duct. Sheathing shall be sufficiently taped to the duct.

2. After installation, free/open ends shall remain protected with taped plastic sheathing and or temporary filters as specified by division or Trade specifications.

3.8. OWNER PROVIDED, CONTRACTOR INSTALLED EQUIPMENT

A. Section 3.8.A. shall apply to all equipment being provided to any contractor directly from the Owner for installation under the contract.
   1. The Owner or Owners Representative shall do the following:
      a. Inspect all deliveries upon receipt and notify manufacturer of any issues directly.
      b. Review the received shipment with the contractor.
         i. Only provide products or materials to the contractor that were not damaged through shipping or handling.
         ii. Confirm missing products or materials and anticipated delivery schedule if known.
   2. The Contractor responsible for the installation of Work associated with Owner provided materials or products shall "take ownership" and provide safe and secure storage and handling as previously described within this specification.
      i. The Contractor shall be liable for the repair or replacement of any material or product damaged after taking ownership of the product from receipt through final acceptance.

B. Section 3.8.B. shall apply to all equipment being provided by the Owner but shipped directly to any sub-contractor or the project site for installation under the contract.
   1. The GC and/or Contractor responsible for the Work associated with the Owner provided materials or products shall do the following:
      a. Inspect all deliveries upon receipt and notify the Owner or Owners Representative of any issues directly.
         i. Owner or Owners Representative shall notify manufacturer of any issues directly.
      b. Review the received shipment with the Owner or Owners Representative
         i. Confirm missing products or materials and anticipated delivery schedule if known.
   2. The Contractor shall "take ownership" and provide safe and secure storage and handling as previously described within this specification.
      i. The Contractor shall be liable for the repair or replacement of any material or product damaged after taking ownership of the product from receipt through final acceptance.

END OF SECTION

SECTION 01 71 23
FIELD ENGINEERING

PART 1 – GENERAL

1.1. REQUIREMENTS INCLUDED

A. The Contractor shall provide and pay for field engineering services required for the Project:
   1. Land surveying services required to execute the Work, to include building addition location and layout, and location and layout of pavements and all proposed site improvements.
   2. Verification of existing building dimensions, elevations, and relationship to proposed additions.
   3. Professional Engineering services to execute Contractor's construction methods.
   4. Registered Professional Engineer in the State of Wisconsin to determine the load capacity of the existing structure for use of Contractors temporary facilities, equipment, lifts, machinery, material storage, etc.

1.2. RELATED REQUIREMENTS

A. Conditions of the Contract

1.3. PROCEDURES

A. A property survey has been prepared for the Owner and has been bound with Contract Drawings. Surveys shall describe physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. If information is incomplete, notify Owner to furnish additional information. Verify easement locations, front, side, and rear yard restrictions, if any; and property line locations. Verify control points, and establish bench marks. Locate and layout roads, walks, parking areas and all civil structures and all proposed site improvements.

B. Verify locations of underground services, utilities, structures, etc. which may be encountered or affected by the Work.

1.4. PROJECT SURVEY REQUIREMENTS

A. Using datum, the lot lines and present levels have been established as indicated on the Drawings. Other grades, lines, levels and benchmarks, shall be established and maintained by the Contractor, who shall be responsible for them. As work progresses, the Contractor shall layout on forms and floor, the locations of all partitions, walls and fix column centerlines as a guide to all trades. The Contractor shall make provision to preserve property line stakes, benchmarks, or datum point. If any are lost, displaced or disturbed through neglect of any Contractor, Contractor's agents or employee, the Contractor responsible shall pay the cost of restoration.

B. Establish lines and levels, locate and layout, by instrumentation and similar appropriate means, additions, column locations, floor levels, stakes for walks, etc.

C. Provide data to all Subcontractors for their use as applicable.

D. From time to time, verify layouts by same methods.

1.5. RECORDS

A. Maintain a complete, accurate log of all control and survey work as it progresses.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 01 73 29
CUTTING AND PATCHING

PART 1 – GENERAL

1.1. SUMMARY

A. This Section includes general procedural requirements for cutting and patching including, but not limited to the following:
   1. Examination
   2. Preparation
   3. Performance
   4. Cleanup and Restoration

1.2. RELATED SPECIFICATION SECTIONS

A. Divisions 02 through 32 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
B. Division 07 Section "Penetration Fire Stopping" for patching fire-rated construction.

1.3. DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.
C. Level Alpha

1.4. QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that may result in increased maintenance or decreased operational life or safety.
C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity that results in reducing their capacity to perform as intended, or that may result in increased maintenance or decreased operational life or safety. Some miscellaneous elements include the following:
   1. Water, moisture, or vapor barriers
   2. Membranes and flashings
   3. Exterior curtain-wall construction
   4. Equipment supports
   5. Piping, ductwork, vessels, and equipment
   6. Noise and vibration control elements and systems
D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.5. WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

B. All cutting and patching work performed under this contract shall be warranted like new work as defined by the Specification governing the work.

PART 2 - MATERIALS

2.1. GENERAL

A. Comply with requirements specified within other sections of the Specifications.

B. In-Place Materials: Use materials identical to existing in-place materials. For exposed surfaces use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1. EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2. PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction and existing conditions during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations. If the failure to protect, or the lack of protection, of in-place construction and/or existing conditions results in damage, the contractor shall be responsible for repair to previous condition.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to eliminate interruption to occupied areas.

3.3. PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete or Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 3l Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

D. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.

3.4. CLEANUP AND RESTORATION

A. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

1. Clean piping, conduit, and similar features before applying paint or other finishing materials.
2. Restore damaged pipe covering to its original condition.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
5. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
6. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.
7. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
8. Any smoke and fire caulking that has been disturbed must be replaced by the Contractor as required by code.

END OF SECTION

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SECTION 01 74 13
PROGRESS CLEANING

PART 1 – GENERAL

1.1. SUMMARY

A. Throughout the execution of this contract all contractors shall be responsible for maintaining the project site in a standard of cleanliness as described in this specification.

B. All contractors shall also comply with the requirements for cleaning as described in other specifications.

C. Work included in this specification shall include but not be limited to:

1. Safety Cleaning
2. Project Site Cleaning
3. Progress Cleaning
4. Final Cleaning

1.2. RELATED SPECIFICAITONS

A. Section 01 35 00 Special Procedures
B. Section 01 60 00 Product Requirements
C. Section 01 74 19 Construction Waste Management and Disposal
D. Section 01 76 00 Protecting Installed Construction

1.3. QUALITY ASSURANCE

A. The General Contractor (GC) shall conduct daily inspections, more often if necessary, of the entire project site to ensure the requirements of cleanliness are being met as described within these specifications.

B. All contractors shall comply with other regulatory requirements as they apply to waste recycling, reuse, hauling, and disposal requirements of any governmental authority having jurisdiction.

C. The Owner reserves the right to have work done by others in the event any contractor fails to perform cleaning as described within these specifications. The cost of any Owner provided cleaning shall be charged to the contractor through a deduct change order.

PART 2 - PRODUCTS

2.1. CLEANING MATERIALS AND EQUIPMENT

A. The Contractor shall provide all required personnel, equipment, and materials necessary to maintain the required level of cleanliness as described in this specification.

B. Use only cleaning materials and equipment that are compatible with the surface being cleaned, as recommended by the manufacturer, or as approved by the A/E.

C. Use only cleaning materials, equipment, and methods as recommended in the manufacturers care and use guide of the material, finish or equipment being cleaned.

PART 3 - EXECUTION

3.1. SAFETY CLEANING

A. All Contractors shall be responsible for safety cleaning as required by OSHA and other regulatory requirements as applicable.

B. Safety Cleaning shall include but not be limited to the following:
   1. All work areas, passageways, ramps, and stairs shall be kept free of debris, scrap materials, pallets, and other large items that would obstruct exiting routes. Small items such as tools, electrical cords, etc are picked up when not in use.
   2. Form and scrap lumber shall have nails/screws removed or bent over. Lumber shall be neatly stacked in an area designated by the GC.
   3. Spills of oil, grease, and other such liquids shall be cleaned immediately or sprinkled with sand/oil-dry first, then cleaned.
   4. Oily, flammable, or hazardous items shall be stored in appropriate covered containers and storage devices unless actively being used.
   5. Oily, or flammable rags, and other such waste shall only be disposed of in authorized covered containers.
   6. Disposal by burning shall not be allowed at any time.

3.2. PROJECT SITE CLEANING

A. This section applies to the general cleanliness of the project site as a whole for the duration of the execution of this contract.

B. Exterior Project Site Areas
   1. The GC and other Contractors as appropriate shall ensure the following levels of cleanliness are applied to the exterior project site areas.
      a. The overall appearance of the project site is neat and orderly. Defined areas for material storage, material waste, job trailers, and the project area are clean and well maintained.
      b. The construction fence is maintained, erect with no gaps, and properly posted per all regulatory requirements.
      c. All erosion control measures are properly maintained, cleaned, and repaired as necessary.
      d. All loose materials (construction or waste) are properly tied or weighted down to resist blowing.
      e. All construction materials are properly covered with fully functional tarps or plastic wrap, protected from the weather, coverings are tied, strapped, or weighted down to resist blowing.
      f. Dust control is applied as necessary or as required by any regulatory requirement.

C. Interior Project Site Areas
   1. All Contractors shall ensure the following levels of cleanliness are applied to the interior project site areas.
      a. The overall appearance of the project site is neat and orderly. Defined areas for material storage, material waste, and project area are clean and well maintained.
      b. Stored materials are kept in original shipping containers whenever possible. Stored materials not in shipping containers are properly stored and protected according to other applicable specifications.
      c. All scraps and debris shall be properly disposed of as often as necessary to keep work areas, passageways, stairs, and ramps free of debris and clear for emergency exiting.
      d. Boxes, pallets, and other such shipping containers, are broken down, stored in a consolidated area or, disposed of as often as is necessary.
      e. Hand tools, supplies, materials, electrical cords not being used are picked up and sptored in gang boxes, not left as walking hazards in work areas, passageways, etc.

D. Job Trailer
   1. The interior of the job trailer shall be kept clean and available as a work space at all times. The GC shall ensure that the following is provided for within the job trailer:
      a. Meeting space including tables and chairs.
      b. Sufficient space for all contractors to access the official construction documents, provide updates, etc.

3.3. PROGRESS CLEANING

A. This sub-section shall apply to all Progress Cleaning prior to the installation of finishes, fixtures, and trim (IE rough-in).
   1. For the purposes of this section “clean” shall be defined as a level of cleanliness free of dust and other material capable of being removed by use of reasonable effort using a good quality janitor broom and shop-vac.
   2. Daily cleanings shall be conducted by all contractors at the end of the work day as follows:
      a. Debris in excavated areas shall be removed prior to backfill and compaction.
      b. Debris in wall cavities, chase spaces, etc shall be removed prior to enclosing the spaces.

c. Large items shall be properly stored, returned to designated areas, or disposed of as necessary.
d. Loose materials shall be properly secured.
e. Flammable or hazardous materials are properly stored or disposed of.

3. Weekly cleaning shall be conducted by all contractors as designated by the GC. Weekly cleanings shall include all the above for a daily cleaning and other necessary cleaning as designated by the GC.

B. This sub-section shall apply to Progress Cleaning in preparation for the installation of finishes, fixtures, and trim.
a. Surfaces receiving finishes shall be thoroughly cleaned prior to contractors applying finish materials. The GC shall be responsible for inspecting the area and surfaces being cleaned for finish prior to the sub-contractor applying the finish. This shall include but not be limited to the following:
i. Wall surfaces shall be wiped clean of dirt and oily residues, vacuumed free of dust, and shall be free of surface imperfections prior to painting or installing wall coverings.
ii. Metal surfaces shall be wiped clean of dirt and oily residues, and be free of surface imperfections prior to painting.
iii. Flooring shall be broom swept of large and loose items then vacuumed clean of dust and small particles, and damp mopped clean and dried prior to installing any flooring finish. Additional cleaning may be required depending on the preparation requirements recommended by the flooring material manufacturer.

C. This sub-section shall apply to Progress Cleaning after the installation of finishes, fixtures, and trim.
1. For the purposes of this section "clean" shall be defined as a level of cleanliness free of dust and other material capable of damaging or visually disfiguring finished work, finishes, fixtures, and trim.
2. Progress Cleaning at this point in the contract shall be conducted immediately as follows:
a. Dust, dirt, etc shall be swept and vacuumed off of finish flooring and trim.
b. Liquid spills shall be cleaned up according to the spill type. This shall include drips and spills caused by paint, stain, sealants, and other such items.
3. The Contractor(s) at no additional cost to the Owner shall be responsible for replacing any finished work, finishes, fixtures, and trim damaged or disfigured because of inadequate or improper cleaning.

3.4. FINAL CLEANING

A. As noted in Specification 01 29 76 Progress Payment Procedures, Progress Payment Milestone Schedule, Final Cleaning shall not be conducted prior to requesting the 90% contract total progress payment and all of the following shall be complete:
1. All final regulatory inspections including but not limited to Building Inspection Department and Madison Fire Department inspections have been successfully completed.
2. All Quality Management Observation (QMO) reports have been closed out.
3. All Demonstration and Training has been completed.
4. All Attic Stock has been consolidated and located to its designated area
5. All protection for installed construction shall be removed prior to final cleaning by the contractor responsible for providing the protections. This shall include the removal of any adhesive residues left behind from tapes. Contractors shall only use manufacturer authorized cleaning materials for removing adhesives, etc.

B. For the purposes of this section "clean" shall be defined as a level of cleanliness generally provided by skilled cleaners using commercial quality building maintenance equipment and materials.

C. The GC shall be responsible for ensuring that all requirements under this section are being met.

D. General Requirements
1. Employ experienced personnel or professional cleaners for final cleaning as necessary for the areas or equipment being cleaned.
2. Cleaning equipment used shall be commercial grade equipment commonly used by professional cleaners.
3. Cleaning equipment and materials shall be cleaned, rinsed, or replaced to ensure a uniform level of cleanliness is being maintained during the final cleaning. This shall include but not be limited to the following:
a. Vacuum cleaner bags and/or filters are changed and/or cleaned as often as necessary.
b. Dust & wipe down rags are washed, rinsed, or replaced before starting each room.
c. Mopping equipment
i. Mop water for washing shall have cleaning solution added to the amount and temperature per manufacturer's recommendations. Mop washing water shall be replaced often to maintain the levels of the cleaning solution and temperature required.
ii. Mop water for rinsing shall remain clean, clear, and be replaced as often as necessary.

iii. Mop heads shall be rinsed often and replaced as necessary.
iv. Mop heads and buckets shall be thoroughly rinsed with each change of water.
v. Only new mop heads shall be used for rinsing.

E. Refer to all other specifications in this contract for specific requirements regarding final cleaning of finishes, fixtures, equipment, etc.

F. Exterior Cleaning shall include but not be limited to the following:
1. All exterior glazing surfaces have been professionally cleaned and are free of dust and streaking.
2. Metal roofs, siding, and other surfaces shall be clean of dirt and free of splashed or excess materials such as sealants, mortar, paint, etc.
3. All exterior furnishings shall be clean, waste receptacles shall be empty.
4. Paved areas shall be clean, free of dirt, oily stains and other such blemishes
5. Exterior lights and diffusers are clean and free of dust.

G. Interior Cleaning shall include but not be limited to the following:
1. Remove all labels, stickers, tags, and other such items which are not required by code as permanent labels.
2. All interior glazing surfaces, including mirrors, have been professionally cleaned and are free of dust and streaking.
3. All interior surfaces have been cleaned of excess materials such as paint, sealants, etc and have been wiped free of dust.
4. Interior metals, fixtures, and trim have been cleaned free of dust and oily residues
5. Carpet flooring has been thoroughly cleaned; vacuumed free of dust, excess glues and other stains removed per manufacturers use and care instructions.
6. Resilient flooring has been thoroughly cleaned; vacuumed free of dust, excess glues and other stains removed, mopped and buffed per manufacturers use and care instructions.
7. Interior non-occupied concrete floors shall be broom cleaned, vacuumed free of dust, excess glues and other stains removed per manufacturers use and care instructions.
8. Light fixtures, lamps, diffusers and other such items have been dusted and cleaned as necessary.

3.5. CALL BACK WORK

A. The GC shall be responsible for ensuring that any contractor returning to the project site for completion or correction work has re-cleaned and restored the area to the levels described in section 3.4 above upon completion of the work. This shall include but not be limited to the following:
1. The immediate area(s) where work was completed.
2. Adjacent areas where dust or debris may have traveled.
3. Other areas occupied during the completion of the call back work.
4. Path of entrance/exit, to/from the area(s) of work.

END OF SECTION

SECTION 01 74 19
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 – GENERAL

1.1. SUMMARY

A. This specification includes administrative and procedural requirements for the recycling, re-use, salvaging, and disposal of non-hazardous construction and demolition waste.

B. The General Contractor (GC) shall be fully responsible for complying with all applicable ordinances and other such regulatory requirements during the execution of this contract.

1.2. RELATED SPECIFICAITONS

A. 01 29 76 Progress Payment Procedures
B. 01 31 23 Project Management Web site
C. 01 32 19 Submittals Schedule
D. 01 33 23 Submittals
E. 01 77 00 Closeout Procedures
F. Other Divisions and Specifications that may address the proper disposal of construction or demolition waste as it pertains to work being conducted under that particular specification.

1.3. CITY ORDINANCES

A. There are two (2) Madison General Ordinances (MGO) that the City of Madison has regarding construction and demolition waste.
   1. MGO 10.185, Recycling and Reuse of Construction and Demolition Debris, describes the requirements associated with this ordinance including definitions, documentation requirements, and penalties.
   2. MGO 28.185, Approval of Demolition (Razing, Wrecking) and Removal, describes the requirements associated with applying for and receiving a demolition permit.

B. All City of Madison, Board of Public Works, contracts being conducted by City Engineering, Facility Management, for construction, remodeling, or demolition shall comply with the above ordinances regardless of project type or size.

1.4. DEFINITIONS

A. Clean: Untreated and unpainted material, free of contamination caused by oils, solvents, caulks, and other chemicals.

B. Construction and Demolition Debris: Materials resulting from the construction, remodeling, repair, and demolition of utilities, structures, buildings, and roads.

C. Disposal: Off-site removal of construction and demolition debris and the subsequent sale, recycling, reuse, or deposit in authorized landfill or incinerator.

D. Hazardous: Exhibiting the characteristics of hazardous substance, i.e. ignitability, corrosiveness, toxicity, or reactivity and including but not limited to asbestos containing materials, lead, mercury and PCBs.

E. Non-hazardous: Exhibiting none of the characteristics of a hazardous substance.

F. Nontoxic: Not immediately poisonous to humans or poisonous after a long period of exposure.
G. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product.
H. Recycle: Any process by which construction or demolition debris is diverted from final disposal as solid waste at a permitted landfill and instead is collected, separated, and/or processed into raw materials for new, reused, or reconstituted products; or for the recovery of materials for energy production processes.
I. Recycler: Any recycling facility, transfer station, or other waste handling facility which accepts construction and demolition debris for recycling, or for other transferring to a recycling facility.
J. Recycling: The process of sorting, cleaning, treating, or reconstituting solid waste and other discarded materials for the purpose of preparing the material to be recyclable. Recycling does not include burning, incinerating or thermally destroying waste.
K. Return: To give back reusable items or unused products to vendors for credit.
L. Reuse: Shall mean any of the following:
    1. The on-site use of reprocessed construction and demolitions debris.
    2. The off-site redistribution of a material, for use in the same manner or similar manner at another location.
    3. The use of non-toxic, clean wood as an alternative fuel source.
M. Salvage: To remove a waste material from the project site for resale or reuse by the Owner or others.
N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
O. Trash: Any product or material unable to be re-used, returned, recycled, or salvaged.
P. Waste: Extra materials or products that have reached the end of its useful life or its intended use. Waste includes salvageable, returnable, recyclable and re-useable construction and demolition materials, and trash.

1.5. PERFORMANCE REQUIREMENTS

A. The GC shall develop a Waste Management Plan that results in end-of-project rates for salvage/recycling/reuse of 95 percent (minimum) by weight of the total waste generated by the Work. Percentages may be adjusted on a project by project basis depending on selected LEED goals associated with the project.
B. The GC shall salvage or recycle 100 percent of all uncontaminated packaging materials including but not limited to the following:
    1. Paper
    2. Cardboard
    3. Beverage containers
    4. Boxes
    5. Plastic Sheet and film
    6. Polystyrene packaging
    7. Wood crates and pallets
    8. Plastic pails and buckets
C. Promote a resourceful use of supplies and materials through proper planning and handling. Generate the least amount of waste possible by minimizing errors, poor planning, breakage, mishandling, contamination or other similar factors.
D. Use all reasonable means to divert construction waste from landfills and incinerators through recycling, reuse, or salvage as appropriate.

1.6. SUBMITTALS AND DELIVERABLES

A. The GC shall provide his/her completed Waste Management Plan to the Project Management Web Site as a submittal for review by the Project Architect and City Project Manager.
    1. See item 1.8 below for Waste Management Plan submittal requirements.
    2. The Waste Management Plan shall be completed, submitted, and approved as a pre-requisite for Progress Payment number 1.
    3. Copies of all documentation required by this specification shall be submitted to the appropriate Project Management Web Site Library. Documentation shall be reviewed by the City Project Manager during all Progress Payment reviews for compliance and accuracy.
B. The Waste Management Coordinator shall provide copies of items 1 through 5 below to the appropriate Project Management Web Site Library and shall update the Waste Management Summary Log to reflect the records being submitted.
    1. Records of Donations: Indicate receipt and acceptance of itemized salvageable waste donated to individuals or organizations. Indicate if the organization is tax exempt.

2. Records of Sales: Indicate receipt and acceptance of itemized salvageable waste sold to individuals or organizations. Indicate if the organization is tax exempt.
3. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts and invoices.
4. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts and invoices.
5. Statement of Refrigerant Recovery: The Refrigerant Recovery Technician responsible for recovering refrigerant shall provide the GC with a statement indicating all of the following:
    a. All recovery was performed according to EPA Regulations.
    b. All refrigerant present was recovered; indicate the total quantity recovered by unit.
    c. Date of Recovery.
    d. Name, address, company name, and phone number of technician performing the recovery.
    e. Technician shall sign and date the statement.

C. LEED Submittal: The GC shall provide the following information using the appropriate LEED letter template upon project completion: indicating that the requirements of the credit have been met. *NOTE: This requirement shall only apply to projects having a LEED certification goal.*
1. Total waste material generated.
2. Total waste material diverted by diversion method; recycling, salvage, re-use, etc.
3. Statement that the credit requirements have been met.
4. GC shall sign the letter.

1.7. QUALITY ASSURANCE

A. Waste Management Coordinator: The GC shall be responsible for designating a Waste Management Coordinator. Coordinator may be the GC Supervisor, GC Project Manager or other member of the GC staff having knowledge of proper waste management procedures and all applicable regulations.
B. Regulatory Requirements: comply with all hauling and disposal regulations of authorities having jurisdiction.
C. The Waste Management Coordinator shall comply with Specification 01 31 19 Project Meetings, Section 3.7.B.1 and conduct a Waste Management Conference at the job site. This conference shall be repeated as necessary as additional trades are added to the Work. The conference shall include but not be limited to the following:
1. Identify the Waste Management Coordinator; provide trade contractors with name, phone, and email information.
2. Review and discuss the Waste Management Plan and the roles of the Coordinator.
3. Review the requirements for documenting and reporting procedures of each type of waste and its disposition.
4. Review procedures for material separation; indicate availability and locations of containers and bins.
5. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
6. Review waste management procedures specific to each trade.

D. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

1.8. WASTE MANAGEMENT PLAN

A. Develop a plan consisting of waste identification, a waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume. Use the same units of measure throughout the waste management plan.
1. Waste Identification: Indicate anticipated types and quantities of site clearing, demolition waste, and construction waste that will be generated during the execution of this contract. Include assumptions for the estimates.
2. Waste Reduction Work Plan: The work plan shall consist of but not be limited to all of the following:
    a. Identify methods for reducing construction waste. Re-using, framing and forming materials, re-planning material cuts to minimize waste, etc.
    b. Identify what types of materials will be recycled. Provide lists of local companies that receive and/or process the materials. Include names, addresses, and phone numbers.
    c. Identify what types of materials will be disposed of and whether it will be disposed of in a landfill facility or by incineration facility. Provide lists of local companies that receive and/or process the materials. Include names, addresses, and phone numbers.
    d. Identify methods to be used on site for separating waste including all of the following:
        i. Sizes of containers to be used.
        ii. Labels to be used on the containers to identify the type of waste allowed in the container.

iii. Designated locations on the project site for waste material containers.

B. If project requires demolition incorporate the ordinance required (MGO 28.185) Recycling and Reuse Plan into the Waste Management Plan.

C. Provide all of the following for the Waste Management Coordinator:

1. Name, employer, employer address, phone number, and email address of the designated coordinator.
   a. The GC shall also provide this information with the required Project Directory Submittal at the beginning of the project.

D. If at the option of the GC, he/she chooses to contract with a Waste Management Disposal Company that allows comingled and unsorted waste materials, the GC shall include with his/her Waste Management Plan the following:

1. Name, address, phone number, state permitting information, and other pertinent information about the disposal company.
2. Documentation from the disposal company indicating company policies and procedures regarding comingled and unsorted waste materials to include:
   a. GC responsibilities on the project site.
   b. Disposal company procedures for receiving, sorting, recycling, and disposing of comingled and unsorted waste material.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. PLAN IMPLEMENTATION

A. Implement the approved waste management plan. Provide adequate containers, storage space, signage, transportation and other items required to implement the plan during the execution of this contract.

B. The GC and Waste Management Coordinator shall be responsible for monitoring and reporting the status of the Waste Management Plan and shall monitor the waste management practices on site as frequently as needed.

C. Train all workers, sub-contractors, and suppliers on proper waste management procedures as appropriate for the work being conducted on the project site.

1. Distribute the waste management plan to everyone concerned within seven (7) days of submittal approval.
2. Distribute the waste management plan to new workers, sub-contractors, and suppliers when they first appear on the project site.
3. Conduct additional training as needed during the execution of the contract to keep a positive focus on the waste management plan.

D. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent and used facilities.

1. Designate and label specific areas on the project site necessary for separating materials to be salvaged, recycled, reused, donated, and sold.
2. Comply with any specification or regulatory requirements pertaining to dust, dirt, environmental protection, and noise control.

3.2. HAZARDOUS AND TOXIC WASTE

A. The Owner shall be responsible under separate contract for the removal of any asbestos related materials. All other materials shall be removed by the GC.

B. All hazardous and toxic waste shall be separated, stored, and disposed of according to all applicable regulations.

C. All hazardous and toxic materials on site shall have a Material Safety and Data Sheet (MSDS) available that indicates storage requirements, emergency information, and disposal requirements as necessary.

3.3. GENERAL GUIDELINES FOR ALL WASTES

A. Recycle all paper and beverage containers used by workers, sub-contractors, suppliers and visitors to the project site.

B. All revenues, savings, rebates, tax credits, and other such incentives received from recycling, reusing, or salvaging waste materials shall accrue to the GC unless specified otherwise in the contract documents.

C. Separate recyclable, reusable, and salvageable waste from other waste materials, trash, and debris except where Waste Management Disposal Company allows comingled waste materials, see section 1.8.D above.

1. Separate by type in appropriate containers or designated areas according to the approved waste management plan away from the construction area. Do not store within the drip lines of existing trees.

2. Inspect containers and bins frequently for contamination and inappropriately sorted materials. Remove contaminated materials and resort as necessary.
3. Stockpile bulk materials such as sand, topsoil, stone, etc., on site away from the construction area and without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water, and cover to prevent windblown dust. Do not store within the drip lines of existing trees.
4. Whenever possible store items off the ground and/or protect them from the weather.

3.4. GUIDELINES FOR RECYCLABLE, RE-USABLE, AND SALVAGEABLE WASTE

A. The following guidelines is not a complete or all inclusive list and shall be adjusted as needed by the methods and procedures identified in the Waste Management Plan.
B. Asphalt Paving: Break-up into transportable pieces or grind, transport to an authorized recycling facility.
C. Carpet and Pad: Separate carpet and pad scraps, containerize and transport to an authorized recycling facility.
D. Ceiling System Components: Suspended ceiling system components shall be sorted by material type as follows:
   1. Broken, cut, or damaged tiles shall be containerized, transport to an authorized recycling facility.
   2. Damaged, or cut tracks, trim and other metal grid system components shall be sorted with other metals of similar types, palletize, transport to an authorized recycling facility.
E. Clean Fill: When allowed by Division 31 Specifications; concrete, masonry, stone, asphalt pavement, sand and other such materials may be used as clean fill on this project site. The GC shall verify with the Project Architect, Structural Engineer, or Civil Engineer as necessary prior to using any materials as clean fill. Materials shall be processed, placed, and compacted as specified. If not being re-used on site, transport to an authorized recycling facility.
F. Clean Wood Materials: Including but not limited framing cutoffs, wood sheathing or paneling materials, structural or engineered wood products, and pallets or crates. Clean Wood shall be free of paints, stains, oils, preservatives and other such contaminates.
   1. Useable pieces shall be sorted by type and dimension, bundled and transported off site by the GC or returned to the supplier.
   2. Non-useable pieces shall be palletized or containerized, transport to an authorized recycling facility.
   3. Clean, uncontaminated sawdust and wood shavings shall be bagged, transport to an authorized recycling facility.
G. Concrete: Break-up into transportable pieces, remove all reinforcing and other metals, transport to an authorized recycling facility.
H. Glass Products: Shall be sorted by types, do not include light fixture lamps and bulbs. Products broken in shipment shall be returned to the supplier. Broken or cracked items still in frames shall be taped to prevent further breakage and injury to workers. Transport to an authorized recycling facility.
I. Gypsum Board: Stack large clean pieces on wooden pallets or container, store in a dry location, transport to an authorized recycling facility.
J. Light Fixture Lamps and Bulbs: Fluorescent tubes shall be containerized, transport to an authorized recycling facility.
K. Masonry and CMU: Remove all metal reinforcing, anchors, and ties, clean undamaged pieces and neatly stack on pallets, transport damaged pieces to an authorized recycling facility.
L. Metals: Sort metals by type as follows, this does not include piping:
   1. Architectural metals including but not limited to siding, soffit, and roofing panels shall be sorted by material, palletize or bundle as needed and transport to an authorized recycling facility.
   2. Structural steel, sort by size and type; palletize and transport to an authorized recycling facility.
   3. Miscellaneous metals such as aluminum, brass, bronze, etc shall be sorted by type, containerized or palletized as necessary, transport to an authorized recycling facility.
M. Packaging and shipping materials
   1. Cardboard boxes and containers: Breakdown all cardboard boxes and containers into flat sheets. Bundle and store in a dry location until transported for recycling.
   2. Pallets:
      a. Whenever possible require deliveries using pallets to remove them from the project site.
      b. Neatly stack pallets in preparation for reusing them or providing them to other companies for salvage or re-use.
      c. Break down pallets into component wood pieces that comply with the requirements for recycling clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
   3. Crates: Break down crates into component wood pieces that comply with the requirements for recycling clean wood materials. Neatly stack or palletize pieces in preparation for transportation.
   4. Polystyrene Packaging: Separate and bag materials.

N. Piping and conduit: Reduce all piping and conduit to straight lengths, sort and store by size, material and type. Remove supports, hangers, valves, boxes, sprinkler heads, and other such components, sort and store by size, material and type. Transport to authorized recycling facilities according to material types.

O. Roofing: Roofing materials shall be sorted and containerized by type, transport to authorized recycling facilities according to material types.

P. Site-Clearing Waste: Sort all site waste by type.

1. Only stockpile soils types and quantities required for re-use on the project site. All remaining quantities shall be transported off site to an authorized facility that receives such materials.
2. Brush, branches, and trees with no marketable re-use shall be transported to facilities for chipping into mulch.
3. Trees with a marketable re-use shall be salvaged and transported to facilities that specialize in processing trees for future use as wood products.

3.5. GUIDELINES FOR DISPOSAL OF WASTES

A. The following guidelines shall be adjusted as needed by the methods and procedures identified in the Waste Management Plan.

B. Any waste that is contaminated, organic, or cannot be recycled, re-used, or salvaged shall be legally disposed of in an authorized landfill or incinerator. Disposal methods shall follow all applicable regulatory requirements.

C. No waste material of any kind, except those types designated as clean fill in section 3.4 above, shall be allowed to be buried on the project site at any time.

D. No burning of any kind of waste material shall be permitted on this project site at any time.

E. Paint and Stain: Paints, stains, and their containers shall be disposed of as follows:

1. Whenever possible containers should be thoroughly cleaned immediately after emptying and sorted with as appropriate (metal or plastic) for recycling
2. Empty containers, regardless of type or base material, may be disposed of with lids off with general garbage.
3. Latex paint may be placed with general garbage if properly solidified as follows:
   a. Small amounts (an inch or less in can): Remove lids and allow paint to dry out in the can and harden. Protect cans from rain and freezing.
   b. Large amounts (more than one inch): Mix paint with equal amounts of cat litter, stir and allow to completely dry. Alternate method: mix with commercial paint hardener.
4. Oil-based or combustible paints and stains, regardless of liquid or solid, shall be transported to an approved facility that takes such items such as Dane County Clean Sweep Sites.

F. Treated Wood Materials: Treated wood materials including but not limited to wood that has been painted, stained, or chemically treated shall not be recycled or incinerated.

END OF SECTION

SECTION 01 76 00
PROTECTING INSTALLED CONSTRUCTION

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide clear responsibilities, guide lines, and requirements related to providing protection to already installed construction.

B. Already installed construction shall include but not be limited to the following:

1. Any existing site feature such as pavement, curbs, drainage features, utilities, landscaping features (trees, shrubbery, plantings, flagpoles, etc) and other such exterior items not associated with the building whether on or adjacent to the project site.
2. Any existing structure on or adjacent to the project site.
3. Any existing interior work that may be adjacent to the new work including all paths of ingress/egress to areas associated with accessing the Work.
4. Any existing feature of any kind within the public right-of-way that may be on the project site property, adjacent to the project site or across the street from the project site.

C. All contractors shall be familiar with the specifications of their Division of Work for specific requirements on protection of the Work.

D. The requirements noted within this specification do not relieve any contractor of the responsibility for compliance with any code, statute, ordinance, or other such regulatory requirement having jurisdictional authority over these contract documents.

1.2. QUALITY ASSURANCE

A. It shall be the responsibility of every contractor and worker assigned to the project to be diligent in protecting all existing work, and newly installed construction.

B. It shall be the General Contractors' (GC) responsibility under the contract to provide all reasonable protection methods, materials, or precautionary measures required to protect new or existing construction as described in within this specification to the project as a whole.

1. The GC shall be responsible to ensure any damaged new or existing construction is repaired or replaced at no additional cost to the Contract.
2. The GC at his/her discretion may direct other contractors to provide and maintain protection of completed work associated with their Division of Work. I.E.: The carpet installer may be required by the GC to provide carpet protection along traveled paths, ingress/egress, etc after installation.

C. It shall be the responsibility of the GC to ensure that all materials being used to protect installed construction are compatible with, and/or adjacent to, the materials being protected. This shall include but not be limited to the material used as covering, tapes used to fasten protective materials, etc.

1.3. RELATED SPECIFICATIONS

A. Parts of this specification will reference articles within "The City of Madison Standard Specifications for Public Works Construction".

1. Use the following link to access the Standard Specifications web page:
   http://www.cityofmadison.com/business/pw/specs.cfm
   a. Click on the "Part" chapter identified in the specification text. For example if the specification says "Refer to City of Madison Standard Specification **2**10.2" click the link for Part II, the Part II PDF will open.
   b. Scroll through the index of Part II for specification 210.2 and click the text link which will take you to the referenced text.
   c. City Standard Detail Drawings (SDD) may be located from the index in Part VIII.

B. Section 01 60 00 Product Requirements

C. Section 01 74 13 Progress Cleaning

PART 2 - PRODUCTS

2.1. FENCING MATERIALS AND BARRICADES

A. Except where noted in other areas of the construction documents, the responsible contractor shall provide a six foot galvanized chain link fence including full height mesh screen at the project lines as shown on the Civil Drawings. For temporary barricade situations, the responsible contractor may provide one of the following that sufficiently provide a sturdy physical barrier and/or visual barrier as necessary for the intended application.

1. Standard orange construction barrels each with a standard rubber base ring and reflective tape
   a. Provide flashing amber lights as needed to increase night time visibility
2. Steel "T" style fence posts
3. 4'0" high standard orange construction fence
4. Traffic barricades
5. Jersey barriers
6. Other types of fencing or barricades typically used in the construction industry

B. The contractor responsible for providing the fencing materials and barricades shall also be responsible for maintaining them. This shall include but not limited to fixing damaged fencing, standing up barrels that have been knocked over, realigning barrels, and ensuring flashing lights are fully operational at all times.

C. The following fencing and barricade designations, and their use descriptions shall be used throughout this specification to provide uniformity in describing protection requirements.

1. Type A, Jersey Barriers, to be used as permanent blocking devices to deny access to alternate project site entrances or exits.
2. Type B, Traffic Barricades, to be used as temporary blocking devices to deny access to alternate project site entrances or exits.
3. Type C, Construction Barrels without construction fencing shall be used for lane closures, temporary blocking devices to deny access and the protection of single locations (I.E. identify the location of an access structure) that do not require fencing.
4. Type D, Construction Barrels with construction fencing where it becomes necessary to surround an object with a complete visual barricade and it is impractical or unacceptable to install fence posts. The surround shall be constructed in such a manner as to provide a buffer zone around and access to the item being protected.
5. Type E, Steel "T" Fence Posts shall be used at the project lines, as indicated on the Civil Drawings, with six foot galvanized chain link fencing to surround an object with a complete visual barricade and it is practical to install fence posts. The surround shall be constructed in such a manner as to provide a buffer zone around and access to the item being protected. All posts shall be driven installed. Surface mounted posts to only be used for temporary barricades. City standard corner site line clearance must be maintained at the corner of Mineral Point Rd and Westmorland Blvd.
6. Type X, Other fencing or barricade types that may be designated and detailed within the construction documents shall use additional alpha numeric designations.

2.2. EROSION CONTROL PROTECTION

A. Refer to City of Madison Standard Specification 210.2 for authorized materials associated with erosion control materials.

2.3. INTERIOR FINISH PROTECTION MATERIALS

A. Except where noted in other areas of the construction documents or this specification the responsible contractor:
   1. Shall not provide the cheapest or least effective method as an effort to meet any protection requirement.
   2. Shall provide materials of sufficient quality, and durability to provide adequate protection based on the seasonal conditions and the anticipated duration at the time the protection will be needed.
   3. Shall provide sufficient quantity of protection material to protect the construction as needed.

B. Prior to installing protective measures the responsible contractor shall propose to the GC, Project Architect (PA) and City Project Manager (CPM) the proposed plan for protection, materials to be used and samples as necessary.
   1. The PA and CPM reserve the right to disapprove any proposed method and/or material and/or make alternate proposals.

PART 3 - EXECUTION

3.1. GENERAL EXECUTION REQUIREMENTS

A. The GC shall be responsible for ensuring all of the following procedures and requirements are implemented as needed for the duration of the Work performed under this contract.

B. The GC shall also be responsible for the following:
   1. Reporting any incident of damage to existing property, right-of-way, or utility to the CPM immediately upon rendering the incident safe, and notifying emergency response teams, and emergency utility crews as needed.
   2. Conduct a site walk through prior to leaving at the end of each day to assess:
      a. Protection measures are properly in place, provide correction actions as necessary.
      b. Note damage to existing completed work and schedule repair/replacement as needed.
   3. Ensure all contractors and workers are being diligent in protecting existing work, and newly installed construction.

3.2. PROTECT ADJACENT PROPERTIES

A. Whenever possible through the design process the City of Madison shall have previously provided notice to adjacent property owners that work will be occurring on or near their property. The City of Madison shall also have obtained any permanent or temporary easements that may be necessary to complete any Work on adjacent properties.

B. It shall be the responsibility of the GC to do the following for all Work under this contract being performed on or adjacent to the property line:
   1. Contact the adjacent property owner and provide him/her with information on the work to be done, equipment to be used, and estimated duration of the work. Information to be updated and communicated to property owner(s) as construction progresses and site conditions change.
      a. If any adjacent property is a rented or leased space the GC shall also make contact and provide the same information to the tenants.
      b. Determine from the owner and/or tenants if there are any concerns for children, pets, special plantings, or other concerns.
   2. Discuss the following with all contractors performing work on or near the property line.
      a. Work to be completed and timeline.
      b. Concerns of adjacent property owners/tenants from item 1 above.
      c. Which protective measures will be necessary to protect adjacent properties and address the concerns of adjacent property owners/tenants.
   3. Ensure all protective measures are placed and maintained during the execution of Work on or adjacent to the property line. Interact with the adjacent property owners/tenants as needed.

C. Any contractor doing work on or adjacent to the property line shall install and maintain any protective measure identified in the contract documents, this specification, or as directed by the GC.

D. The GC shall be responsible for restoring any damage to structure and property located on or adjacent to the property line.
   1. Restoration shall include but not be limited to repair or replacement using like materials and finishes to its original condition or better.
   2. Restoration of landscaping materials shall include watering of any seed, sod, or other planting of any kind for a reasonable period of time to encourage germination and root development.

E. The GC shall keep the CPM informed directly to any issues pertaining to adjacent property owners and tenants.

3.3. PROTECT LANDSCAPING FEATURES

A. Except where specifically stated in other areas of the construction documents the following minimal protection requirements shall apply under this section.
   1. Whenever possible do not install new landscape features until exterior building construction has been completed, equipment such as scaffolding and lifts are no longer needed and have been removed, and heavy equipment operation is no longer required.
   2. Whenever possible remove and temporarily store all existing landscape features such as benches, waste receptacles, signage, and other such features that will be within the area of Work that can be removed.
   3. Landscape features that cannot be removed such as flag poles, light poles, light bollards, etc. shall be protected with Type D fencing for areas on pavement or Type E fencing for areas on soil.
   4. Planting beds shall be protected using Type E fencing around the exposed perimeter of the planting bed as needed.
   5. The City of Madison Standard Specification 107.13 shall apply to all tree protection in and around the project site at all times.

3.4. PROTECT UTILITIES

A. The contractor shall be responsible for notifying all utilities to determine emergency response procedures and protection requirements prior to installing any construction protection.
   1. This includes requesting utility marking through Diggers Hotline.
      a. Call 811 or 1-800-242-8511 to request a public utility locate
      b. For emergency locate call (262) 432-7910 or (877) 500-9592
   2. Contact the Owner and CPM for any available private utility information on the property that may be available prior to calling a private utility locating company.

B. Except where specifically stated in other areas of the construction documents the following minimal protection requirements shall apply under this section.
   1. Hydrants, lamp posts, electrical transformers, and other utility pedestals shall be protected with Type D fencing for areas on pavement or Type E fencing for areas on soil. Fence posts shall be located so as to not be directly over the utility main.
   2. Storm sewer structures in pavement shall have proper inlet protection according to City of Madison Standard Specification 210.1(g) and Type C Construction Barrels when necessary.
   3. Storm sewer structures in turf and other landscaped areas shall have proper inlet protection according to City of Madison Standard Specification 210.1(g) and Type E fencing for areas on soil.
   4. Stormwater management features such as greenways, retention/detention ponds, bio-filtration ponds and other such features shall be properly protected according to the appropriate erosion control measure specified on the Erosion Control Plan. See multiple sections of City of Madison Standard Specification 210.1
      a. For the protection of hard to see items such as structures, castings, inlets, etc. in grassy areas provide Type E fencing for areas on soil.
      c. For the protection of storm water management features having special soils and plants such as bio-filtration ponds provide Type E fencing for areas on soil.
   5. Other structures and covers including but not limited to cleanouts, wiring hand holes, valve boxes, access structures, grease trap structures, etc shall be protected as follows:
      a. Provide Type E fencing for areas on soil.
      b. When paving operations are complete provide a construction barrel or cone near structures as necessary depending on required heavy construction traffic.

3.5. PROTECT PUBLIC RIGHT OF WAY

A. Except where specifically stated in other areas of the construction documents the following minimal protection requirements shall apply under this section.
   1. All public right-of-way (area from behind the sidewalk to the centerline of the street) shall remain open and accessible except during periods of active work. At such times the public right of way shall be properly closed and signed as referenced in City of Madison Standard Specification 107.9.
   2. Bus stops and bus stop structures shall remain accessible at all times.
   3. Traffic signage and traffic signals, traffic control boxes shall be protected with Type D fencing for areas on pavement or Type E fencing for areas on soil.
      a. Protection at traffic signage/signals shall not obstruct the viewing of the sign/signal for its intended purpose at any time.

B. When additional protection for traffic control is required, the use of barricades, guardrails, lane closures and other such procedures will be detailed within the construction documents.

C. When additional protection for overhead sidewalk cover is required the contract documents shall indicate the specific location and structural requirements of the protective structure.

3.6. PROTECT STORED MATERIALS

A. All contractors shall refer to Specification 01 60 00 Product Requirements for all storage and protection requirements of building materials and products delivered to the site.

3.7. PROTECT WORK - EXTERIOR

A. Provide all temporary services that may be required to protect the installed material from heat, cold, humidity, etc, while materials such as concrete, mortar, sealants, paints, etc, are drying and/or curing.

B. Open trenches, pits, and other such excavations shall be properly covered, lined, or shored as needed during periods of inclement weather to prevent the caving of soils onto existing work in progress. Refer to the appropriate specifications and/or regulatory requirements governing this type of work as necessary.

C. Provide adequate protection at all openings with heavy duty tarps, plastic sheathing, or wood framing and sheathing as needed to protect interior work in progress from inclement weather as needed.

D. Protect exterior finishes of all kinds with heavy duty tarps or plastic sheathing as needed while landscaping is being installed through full germination of seeded areas or installation of filter fabric and mulches to keep dust, dirt, and mud off of finished exterior surfaces.

E. Designate specific curb mounting points and provide wood blocking where small vehicles, skid loaders and other such equipment may need access to areas being landscaped.

F. Provide plywood turning pads for skid loaders to turn on to prevent tire marking on new pavement.

G. Do not permit the parking of vehicles with any kind of fluid leaks to park on new pavement.

H. The contractor shall be responsible for cleaning, repairing, or replacing any completed work or work in progress under this specification as deemed necessary by the CPM without additional cost to the contract.

3.8. PROTECT WORK - INTERIOR

A. The GC shall do all of the following:

1. Provide all temporary services that may be required to protect the installed material from heat, cold, humidity, etc, while materials such as concrete, mortar, sealants, paints, etc, are drying and/or curing.
2. Provide adequate visual and/or physical protection as needed to protect newly completed interior work such as paint, flooring material, sealants, grouts, etc that may be drying and/or curing.
3. Provide adequate space and materials for cleaning boots, tool boxes, supplies, and other items coming into the project site once finish work has begun.
4. Clean dirtied areas and repair/replace damaged areas immediately.

B. The contractors responsible for interior work shall be responsible for protecting their work and finishes from dirt, mud, snow, spills, splatters, and physical damage after installation as follows:

1. Protect vinyl composite, rubber composite, painted/stained concrete, and tiled flooring as follows:
   a. Define foot traffic areas and protect with Ramboard Temporary Floor Protection products as a minimum basis of design or other protection product(s) compatible with installed flooring product if Ramboard is not compatible. Products to be used shall be new.
      i. Tape all edges, seams, etc with a good quality tape that does not leave sticky residue. Do not allow any debris or other material between the installed flooring and the protection material.
      ii. Repair tears immediately, replace worn areas with like material as necessary.
2. Protect carpeted areas as follows:
   a. Define foot traffic areas and protect with a minimum of 6mil, clear, polyethylene sheeting 3 feet wide. Products to be used shall be new.
      i. Tape all edges, seams, etc with a good quality tape that does not leave sticky residue. Do not allow any debris or other material between the installed flooring and the protection material.
      ii. Repair tears immediately, replace worn areas with like materials as necessary.
3. Protect all finished walls in high traffic areas with Ramboard Temporary Wall protection products or approved equal.
      i. Tape all edges, seams, etc with a good quality tape that does not leave sticky residue. Do not allow any debris or other material between the installed flooring and the protection material.

ii. Repair tears immediately, replace worn areas with like materials as necessary.

3. Protect counter tops, cabinets, and other finished surfaces with large sheets of thick cardboard or Ramboard products. Do not allow toolboxes, finish materials, parts and other such items to be placed on finished materials.

C. All protection shall stay in place until the CPM, PA, and GC mutually deem the project is ready for Final Cleaning. The contractors responsible for protecting the work shall be responsible for removing the protection and removing any adhesive residue at that time. Contractors shall only use manufacturer authorized cleaning materials for removing adhesives, etc.

D. Contractors doing work in un-protected areas of finished work shall be required to provide drop cloths and other protection as noted within this specification for the duration of their work.

1. Finished areas shall be sufficiently covered to accommodate all equipment, and materials being used to complete the work being done.
2. Finished areas shall be sufficiently covered to prevent splatters, over spray, etc when doing touch-up work.
3. Contractors who do not provide sufficient protection under this sub-section shall be responsible for any costs associated with cleaning, repairing or replacing already finished construction at no additional cost to the contract.

END OF SECTION

SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to clearly define and quantify the requirements associated with closing a City of Madison Public Works Contract for facility related work.

B. All contracts have two distinct but related paths. Each path needs to be properly closed independently in order to close the contract as a whole.

1. Construction closeout is related to closing out all of the Work associated with the construction documents.
   a. It shall be the responsibility of all contractors to be fully aware of the required Work and closeout requirements involved in their individual trades.
2. Contract closeout is related to closing out all of the administrative aspects of the contract in general.
   a. It shall be the responsibility of all contractors to be fully aware of the administrative requirements required by the contract and to provide the supporting documentation required.
3. Construction Closeout must be completed before Contract Closeout can begin.

C. This specification will provide general knowledge associated with the following areas:

1. Construction Closeout Requirements
2. Construction Closeout Procedure
3. Contract Closeout Requirements
4. Contract Closeout Procedure
5. Final Payment and Certificate of Completion

1.2. RELATED SPECIFICATIONS

A. Contractors shall review all references to other specifications including specifications relating to the execution of the Work associated with their Division or Trade.

B.	Section 01 29 76	Progress Payment Procedures
C.	Section 01 31 23	Project Management Web Site
D.	Section 01 32 26	Construction Progress Reporting
E.	Section 01 45 16	Field Quality Control Procedures
F.	Section 01 74 13	Progress Cleaning
G.	Section 01 45 16	Construction Waste Management and Disposal
H.	Section 01 76 00	Protecting Installed Construction
I.	Section 01 78 13	Completion and Correction List
J	Section 01 78 23	Operation and Maintenance Data
K.	Section 01 78 36	Warranties
L.	Section 01 78 39	As-Built Drawings
M.	Section 01 78 43	Spare Parts and Extra Materials
N.	Section 01 79 00	Demonstration and Training
O	Section 01 91 00	Commissioning

P. Other requirements as noted in the contract documents signed by the General Contractor

1.3. DEFINITIONS

A. ***Substantial Compliance***: A letter provided to the City of Madison Building Inspection and signed by the Project Architect indicating that all Work has been completed to a level that would allow Owner Occupancy and that all construction is in compliance with the construction documents. A copy of this letter is also provided to the State of Wisconsin Department of Health and Safety as necessary to clear plan review requirements. This letter does not represent construction closeout.

B. ***Certificate of Occupancy***: The Regulatory letter from the City of Madison Building Inspection Department indicating that all regulatory requirements and inspections have been completed and the building may now be occupied for its intended use. This letter does not represent construction closeout.

C. ***Certificate of Substantial Completion***: A letter provided by the Department of Public Works, signed by the City Engineer indicating that Construction activities are substantially complete. This letter does represent construction closeout and the date of this letter begins the date of the Warranty Period.

D. ***Construction Closeout***: The point in the contract where all contractual requirements associated the execution of the Work as described in the plans, specifications, and other documents have been successfully met and the items described in 1.3.A, .B, and .C above have been completed.

E. ***Final Progress Payment***: The progress payment associated with achieving Construction closeout as described in 1.3.D above. At this point the contractor may request all monies associated with the contract be paid with the exception of held retainage.

F. ***Contract Closeout***: The point in the contract where all contractual requirements associated with the City of Madison, Board of Public Works contract has been successfully met.

G. ***Final Payment***: The final contract payment submittal that may be approved by the City of Madison after all contractual requirements of the Public Works Contract have been met and any remaining monies (retainage) due to the contractor may be released for the Final Payment.

1.4. QUALITY ASSURANCE – CONSTRUCTION CLOSEOUT

A. All contractors shall be responsible for properly executing the construction closeout requirements associated with their Work as described in the specifications governing their Work.

B. The GC shall be responsible for all of the following:

1. Ensuring that all contractors have met the construction closeout requirements associated with their Work.
2. Coordinate the collection of all construction closeout deliverables from all contractors, provide the deliverables to the Project Architect and City Project Manager for review as necessary, and ensure all contractors correct deficiencies of deliverables and resubmit as needed for final acceptance.
3. Ensure all closeout requirements identified in the Construction Closeout Checklist below have been completed as intended by the construction documents.

1.5. QUALITY ASSURANCE – CONTRACT CLOSEOUT

A. The City of Madison, Department of Civil Rights (DCR) monitors contract compliance for construction and procurement contracts to ensure that local, state and federal regulations are followed by contractors working on City of Madison Public Works (PW) projects. DCR will monitor all PW projects from contract award through the final payment at the close of the project. Contractors will be required to submit reporting paperwork throughout the PW project process.

1. Contractors are encouraged to visit the web site identified below for additional information, checklists, forms, and other information provided by DCR as it relates to Contract Compliance.
   http://www.cityofmadison.com/Business/PW/contractCompliance.cfm
2. Questions regarding the process should be directed to parties and offices as identified on the various forms, documents, and instructions or contact:
   City of Madison, Department of Civil Rights
   210 Martin Luther King Jr. Blvd., Room 523
   Madison, WI 53703
   (608) 266-4910

B. All Sub-Contractors have submitted the applicable required documents described in item 1.5.D below to the General Contractor (GC) for Contract Closeout.

C. The GC has submitted the required applicable documents described in item 1.5.D below for all contractors to the appropriate City of Madison Agency per instructions associated with each submittal.

D. The documents required for submittal to the City of Madison for Contract Closeout may include any/all of the items listed below depending on contract type. It is the sole responsibility of all contractors to know and submit the required and complete documentation in a timely fashion.

1. Weekly Payroll Reports
2. Employee Utilization Reports
3. Agent or Subcontractor Affidavit of Compliance with Prevailing Wage Rate Determination
4. Prime Contractor Affidavit of Compliance with Prevailing Wage Rate Determination
5. Documentation required for Small Business Enterprise (SBE) goals
6. Other documents as maybe required or requested through the Finalization Review Process

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. CONSTRUCTION CLOSEOUT CHECKLIST

A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work to provide a complete and comprehensive list of all Construction Closeout Requirements to the GC.
   1. The checklist shall include all items identified within the construction documents that require any of the following (and examples) prior to moving into Contract Closeout Procedures:
      a. Documents indicating a specified level of performance has been achieved, such as:
         i. Test reports of all types
         ii. Startup reports
      b. Required documentation, such as:
         i. As-builts and record drawings
         ii. Operation and maintenance data
      c. Physical items to be turned over to the owner, such as:
         i. Attic stock
         ii. Keys
      d. Required maintenance completed, such as:
         i. Ducts cleaned
         ii. Filters replaced
      e. Commissioning and LEED related items and submittals
      f. Owner and Maintenance Training

B. Each list shall indicate the title of the closeout requirement, the associated specification of the requirement, the required result or deliverable, the responsible contractor(s), and a column to verify the item has been turned in and completed.

C. The GC shall be responsible for all of the following:
   1. Consolidating all the closeout lists into one master Construction Closeout Checklist.
      a. The checklist shall be in a tabular data format similar to the sample below
   2. Upload the completed checklist to the Contract Closeout-Miscellaneous Documents Library on the Project Management Web Site for review.
   3. Resubmit the checklist as needed after initial reviews have been completed.

D. The GC shall work with all contractors to amend the Construction Closeout Checklist throughout the execution of the project based on changes and modifications as necessary.

Title	Specification	Description	Responsibility	Completed
Quality Management Observation Reports	01 45 16	All QMO reports have been properly responded to, reviewed and closed by the CPM.	All, GC	
As-Built Drawings	01 78 39	As-Built drawings have been reviewed and accepted per the specification	All, GC	
Testing and Balancing of HVAC	23 09 23	Provide final TnB reports indicating design performance has been achieved	HVAC	

3.2. CONSTRUCTION CLOSEOUT REQUIREMENTS

A. The timely submittal or completion of closeout requirements shall go hand in hand with the Progress Payment Milestone Schedule that can be found in Specification 01 29 76 Progress Payments. No payments shall be made until all requirements for that payment have been met.
   1. The GC and all major Subcontractors, PA, and CPM, shall review all requirements for Construction/Contract Closeout during two (2) special meetings.

a. The first meeting shall be held at the 50% Contract Total Payment milestone. This meeting shall discuss the requirements associated with various construction/contract closeout documentation and events when they are due with respect to progress payments.
b. The second meeting shall be held at the 70% Contract Total Payment milestone. This meeting shall review the contractors progress regarding the closeout checklist, begin making plans for upcoming deadlines such as scheduling training, where to put attic stock, and when they are due with respect to progress payments.

2. The GC, PA, and CPM, shall utilize the Construction Closeout checklist to ensure that all construction closeout requirements have been met.

3.3. CONSTRUCTION CLOSEOUT PROCEDURE

A. Upon successful completion and final acceptance of all Construction Closeout Requirements the GC may submit to the CPM and PA the request for Final Progress Payment (100% contract total, less retainage).

B. The PA will confirm with the design consultants, CPM, and other City of Madison staff that all requirements of the Work have been completed and will do the following:
1. Approve the final progress payment application
2. Provide the required signed payment documents to the CPM
3. Provide the required Letter of Substantial Compliance to the following as required:
a. State Safety and Building Division
b. Local Building Inspection office
c. GC
d. CPM

C. The CPM shall draft the City Letter of Substantial Completion for signature by the City Engineer. This letter shall state any of the following that may still be tied to the contract and/or warranty:
1. Indicate that the date of the letter shall also be the beginning of the Warranty period.
2. Indicate any allowed due outs, reasons for them, and anticipated dates of finalization.
a. QMO issues such as off season testing of equipment
b. Off season training of equipment

D. The GC and all subcontractors shall finalize all warranty letters associated with their Work using the date noted on the City Letter of Substantial Completion, and provide the CPM with all warranties as described in Specification 01 78 36 Warranties. Upon receipt and final approval of the Warranties the CPM may initiate final processing of the Final Progress Payment (100% contract total, less retainage).

3.4. CONTRACT CLOSEOUT REQUIREMENTS

A. The GC and all sub-contractors shall follow all requirements associated with documenting contract compliance and provide documentation as required or requested by DCR or PW staff. All contractors are encouraged to stay current with submissions of the following documentation:
1. Weekly Payroll Reports no later than the Progress Payment equal to 50% of the contract total.
2. Employee Utilization Reports
3. Agent or Subcontractor Affidavit of Compliance with Prevailing Wage Rate Determination
4. Prime Contractor Affidavit of Compliance with Prevailing Wage Rate Determination
5. Documentation required for Small Business Enterprise (SBE) goals
6. Other documents as maybe required or requested through the Finalization Review Process

B. Near the Progress Payment equal to 80% of the contract total the GC shall request in writing a Finalization Review. At that time DCR or PW staff shall prepare a report of all contract documentation submitted to date. A list of missing items or outstanding issues will be emailed to the GC. <u>No additional follow-up will be generated by DCR or PW Staff</u>.

3.5. CONTRACT CLOSEOUT PROCEDURE

A. The Contract Closeout Procedure will not begin until the Construction Closeout Procedure has been completed.

B. When the GC feels he/she has successfully met all of the Contract Closeout Requirements associated with Section 3.3 above the GC may submit to the request for Final Payment to the CPM.

C. The CPM shall sign and submit the Final Payment request for processing.

D. DCR and PW staff shall do a complete review of all documentation associated with item 3.3.A above.

E. The GC shall be notified directly by DCR or PW Staff of any documentation that may still be missing, have incomplete information, or other outstanding issues. It shall be the responsibility of the GC to continue follow-up with DCR and PW staff until all documentation has been successfully submitted and accepted.

F. When all required documentation associated with Contract Closeout has been successfully submitted and accepted by DCR and PW Staff the City of Madison shall process the Final Payment of any remaining monies including retainage.

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SECTION 01 78 13
COMPLETION AND CORRECTION LIST

PART 1 – GENERAL

1.1. SUMMARY

A. The City of Madison has developed a multi-faceted Quality Management Program that begins with contract signing and runs through contract closeout to ensure the best quality materials, workmanship, and product are delivered for the contracted Work.

1. The Progress Management Web Site is a Construction Management tool that provides contractors, consultants, and staff a single on-line location for the daily operations and progression of the Work.
2. The Quality Management Observation (QMO) is an ongoing observation of the construction process as it progresses. The City of Madison does not use a "Punch List" or "Corrections List" as it is typically known throughout the construction industry. The QMO process acts as an "in progress punch list". Work identified as not in compliance with the contract documents by the Owner, Owner Representatives, Owner Consultants, etc. shall be resolved immediately at the Contractor's expense. Unresolved issues will be subject to withholding of progress payment(s) until completed.
3. Very stringent expectations are tied to Construction Closeout and Contract Closeout procedures. Specific milestones throughout the project need to be met and the milestones are tied to the Progress Payment Schedule.

B. All contractors shall be required to review the specifications identified in Section 1.2 below, and other related specifications identified therein to become familiar with the terminology and expectations of this City of Madison Public Works contract.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 45 16 Field Quality Control Procedures
D. Section 01 77 00 Closeout Procedures

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 – EXECUTION – THIS SECTION NOT USED

END OF SECTION

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SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide clear responsibilities and guide lines related to providing well documented and complete Operation and Maintenance (O&M) Data related to general facility use, equipment, systems, finishes, and materials to City of Madison Staff (Owner, Owner Representatives, Maintenance, and Custodial Personnel) as needed.

B. Operation and Maintenance Data shall apply to both of the following categories except where specific requirements are noted under their separate titles as follows:

1. Operation and Maintenance Data: Generally shall mean the owner manual that provides information on start-up, shut-down, operation, troubleshooting, maintenance, parts, and other such documentation as it pertains to all equipment and systems installed under the Work.
2. Use and Care instructions: Where applicable use and care instructions shall also be considered O&M for such things as flooring, tile, partitions, and other such finishes and trim related items, installed under the Work.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 77 00 Closeout Procedures
D. Section 01 78 13 Completion and Correction List
E. Section 01 78 19 Maintenance Contracts
F. Section 01 78 36 Warranties
G. Section 01 79 00 Demonstration and Training
H. Section 01 91 00 Commissioning
I. Other Divisions and Specifications that may address more specifically the requirements for O&M Data.

1.3. QUALITY ASSURANCE

A. All O&M Data shall meet the requirements identified in Section 1.4 below.

B. All contractors shall provide O&M Data for each piece of equipment, system, or finish installed during the installation of the Work. O&M Data shall be provided to the General Contractor (GC) for verification and submittal.

C. The GC shall be responsible for receiving all required O&M Data files from all contractors for verifying that all files submitted meet the requirements in Section 1.4 below.

1.4. O&M DATA REQUIREMENTS

A. O&M Data shall be provided in digital PDF format as follows:

1. PDF files shall be complete first generation consumer useable editions of PDF documents as provided by any of the following:
   a. Product manufacturer
   b. Supplier of product
   c. Product manufacturer internet site

2. Acceptable PDF files shall have the following functionality:
    a. Word searchable
    b. Key areas are bookmarked
    c. Table of Contents and/or Index linked to content is preferred whenever possible.
3. Scanned printed material, with word searchable capabilities, saved as a PDF, is not acceptable and will be rejected without further review.

B. O&M Data shall include but not be limited to the following manufacturers' published information as appropriate for the equipment, system, material, or finish:
1. Installation instructions
2. Parts lists, assembly diagrams, explosion diagrams
3. Wiring diagrams
4. Start-up, shut-down, troubleshooting and other related operation procedures
5. Lubrication, testing, parts replacement, and other such maintenance procedures
6. General use, care, and cleaning instructions
7. Special precautions and safety requirements
8. A list of certified equipment vendors, service companies, parts suppliers including company name, address, and phone number
9. A list of the recommended spare parts to have on hand at all times
10. A list by type of all recommended lubes, oils, packing material, and other maintenance supplies
11. Copies of final test reports, balance reports, and other related documentation
12. Warranty information for equipment and systems

1.5. O&M DATA SUBMITTALS

A. O&M Data shall be prepared as identified in this specification and shall be submitted for review as per the schedule identified in Specification Section 01 29 76, Progress Payment Procedures.

B. O&M Data Draft submittals will be reviewed for content, procedure, and compliance only. A general critique with recommendations for improvement will be made but re-submittals will not be required.

C. O&M Data Final submittals will be reviewed for content, procedure, and compliance. Re-submittals will be required until such time as each submittal is accepted.

NOTE: Acceptance of O&M Data Final submittals is required to be complete prior to scheduling and conducting owner related training and construction closeout.

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. O&M DATA PREPARATION - GENERAL

A. All contractors shall prepare O&M Data for draft and final submission as follows:
1. Obtain digital PDF files for each piece of equipment, system, material or finish as described in Sections 1.4.A.1 and 1.4.A.2 above.
2. Verify that all information as described in Section 1.4.B above is included with the PDF file. Obtain missing information as necessary for a complete submittal.

B. Rename each individual PDF file as follows.
1. Do not use special characters such as #, %, &, /, etc. These characters are reserved by the Project Management Web Site software the City of Madison uses; however the under-score (or under-bar) '_' is an allowed character.
2. Use the following format and examples for renaming your file:
    a. Format: ***Equipment name_What_Project name_Contract number_Year***
        i. *Equipment Name* represents the name of any equipment, system, material or finish as designated in the Contract Documents.
        ii. *What* represents what the file is about
        iii. *Project Name* represents the title of the project or contract. A shortened version of the title may be identified by the City Project Manager to be used by all contractors.
        iv. *Contract number* is the specific identification number the Work was bid under and appears on the plan set title sheet and in each sheet title block
        v. *Year* represents the year the contract will be closed out
    b. Examples of file names

i. AHU 2_Operation Manual_Fire Admin_1234_2015
ii. CPT 2_Use and Care_MPD West_9876_2011

C. All contractors shall submit the completed digital PDF files to the GC in sufficient time for the GC to meet the O&M Data submission deadlines as described in Specification Section 01 29 76, Progress Payment Procedures.

D. O&M Data shall be submitted and reviewed as described in sections 3.2 and 3.3 below.

3.2. O&M DATA DRAFT SUBMITTAL

A. All contractors shall prepare and submit the following for an O&M Data Draft review submittal:
1. Prepare three (3) complete O&M Data file samples as described in section 3.1 above.
2. Review all specifications within his/her Division of Work and prepare a complete O&M Data checklist listing all equipment, systems, materials, or finishes. Checklist shall be in tabular form similar to the example below and shall indicate the title (and plan identifier when applicable) of the O&M Data, the associated specification, and a column to verify the item has been turned in and completed.

B. The GC shall be required to review all contractors' samples and checklists for compliance with this specification and shall return any to the originating contractor that are insufficient for re-submittal.
1. When acceptable to the GC, he/she shall upload each O&M Data draft submittal file to the O&M Draft library on the Project Management Web Site.

C. The Project Architect, City Project Manager, CxA, Consulting Staffs and Owner Representatives shall review the O&M Data draft submittals and checklist within fifteen 15 working days as follows:
1. Provide general critique comments by Division on O&M Data samples submitted. Critique is intended to provide all contractors with information on strengths and weaknesses of their submittals.
a. Re-submittal of the O&M Data samples will not be required.
2. Review in detail the O&M Data Checklist for completeness. Provide comments as needed.
a. Re-submittal of the O&M Checklist will be required until accepted.

Title	Specification	Completed
Overhead Door Operator	08 36 00	
Air Handling Unit (AHU-3)	23 00 00	
Water Heater (WH-1)	22 30 00	

3.3. O&M DATA FINAL SUBMITTAL

A. All contractors shall prepare and submit the following for an O&M Data Final review submittal:
1. Prepare complete O&M Data files as described in Section 3.1 above according to their approved checklist as described in Section 3.2 above.
2. Submit completed checklist and all final O&M Data files to the GC for final submittal review.

B. The GC shall be required to spot check all contractors' submittals for completeness against their checklists and for compliance with this specification and shall return any to the originating contractor that are insufficient for re-submittal.
1. When acceptable to the GC, he/she shall upload each O&M Data final submittal file to the O&M Final library on the Project Management Web Site.

C. The Project Architect, City Project Manager, CxA, Consulting Staffs and Owner Representatives shall review the O&M Data final submittals and checklist within fifteen (15) working days as follows:
1. Review the files submitted against the checklist and request any missing files through the GC.
2. Review in detail all of the O&M Data files for completeness.
a. Submittals shall be accepted or rejected as individual PDF files.
b. Contractors shall re-submit entire O&M submittal if any portion is rejected or incomplete.

3.4. CONSTRUCTION CLOSEOUT

A. All contractors shall review Specification 01 77 00, Closeout Procedures and Specification 01 79 00 Demonstration and Training.
1. Acceptance of all final O&M Data submittals is required prior to scheduling Demonstration and Training Sessions.
2. Completion of all Demonstration and Training Sessions is required to receive the Substantial Compliance for Occupancy Certificate, and to begin Construction Closeout procedures.

END OF SECTION

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SECTION 01 78 36
WARRANTIES

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide clear responsibilities and guide lines related to providing all Warranties and Guarantees related to the Work, workmanship, materials, equipment, and other such items required by the Construction Documents.

B. Manufacturers' disclaimers and limitations on product warranties do not relieve any contractor of the warranty on the Work that includes the product.

C. Manufacturers' disclaimers and limitations on product warranties do not relieve suppliers, manufacturers and any contractor required to provide special warranties under the contract documents.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 31 23 Project Management Web Site
C. Section 01 77 00 Closeout Procedures
D. Section 01 78 23 Operation and Maintenance Data
E. Section 01 91 00 Commissioning
F. Other Divisions and Specifications that may address more specifically the requirements for Warranties related to the installation of all items and equipment installed under the execution of the Work.

1.3. DEFINITIONS

A. See specification 01 77 00 for the definitions of the following terms that may also be used in this specification:
1. Substantial Compliance
2. Certificate of Occupancy
3. Certificate of Substantial Completion
4. Construction Closeout
5. Contract Closeout

B. Emergency Repair: The Owner or Owner Representative reserves the right to make emergency repairs as required to keep equipment or materials in operation or to prevent damage to property and injury to persons without voiding the contractors warranty or bond or relieving the contractor of his/her responsibilities during the warranty period.

C. Installer: The company or contractor hired to install a finished product that was manufactured and supplied specifically for the Work within this contract. The Installer may or may not be the same company that supplied the product. See the definition for supplier.

D. Supplier: Any company that makes a specific finished product for the Work from information within the Contract Documents. Examples of suppliers would include custom cabinets, steel stairs and railings, etc. A supplier would not be a company that distributes items manufactured by others such as an electrical or plumbing supplier.

E. Warranty: A written guarantee from the manufacturer to the owner on the integrity of a product and its installation, and the manufacturers' responsibility to repair or replace the defective product or components within a specified time from the date of ownership. Warranty may also be used interchangeably with Guarantee. The following warranty types may be part of any specification within the Work associated with the Construction Documents:

1. Expressed Warranty: A warranty that provides specific repair or replacement for covered components of a product over a specified length of time.
2. Implied Warranty: A warranty that is not stated explicitly by a seller or manufacturer that the product is merchantable and fit for the intended purpose.
3. Standard Product Warranty: Preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner. Standard warranties may be for any amount of time but shall not be for anything less than one (1) year from the warranty date.
4. Special Warranty: A written warranty required by the Contract Documents either to extend the time limit provided under a standard warranty or to provide greater rights to the Owner.

F. Warranty Date: The effective date that begins all warranty periods required for products, installations, and work-manship associated with the execution of the Work for this contract. The Warranty Date shall be set by the CPM.

G. Related Damages and Losses: When correcting failed or damaged Warranted Work, remove and reinstall (or replace if necessary) the construction that has been damaged as a result of the failure or the construction that must be removed and replaced to obtain access for the correction of Warranted Work.

H. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected reinstate the warranty by a new written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation unless specifically noted otherwise in a specification.

I. Replacement Cost: All costs that may be associated with Work being replaced under warranty including but not limited to the following:
1. Related damages and losses
2. Labor, material and equipment
3. Permits and inspection fees
4. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its anticipated useful service life.

J. Replacement Work: All materials, products, required labor, and equipment necessary to replace failed or damaged warranted to an acceptable condition that complies with the requirements of the original Construction Documents.

K. Owners Recourse: Expressed warranties made to the Owner are in addition to implied warranties and shall not limit the duties, obligations, rights, and remedies otherwise available under the law. Expressed warranty periods shall not be interpreted as limitations on the time in which the Owner can enforce such other duties, obligations, rights, and remedies.
1. Rejection of Warranties: The Owner reserves the right to reject any warranty and to limit the selection of products with warranties not in conflict with the requirements of the contract documents.
2. Where the Contract Documents require a Special Warranty or similar commitment on the Work or product, the Owner reserves the right to refuse acceptance of the Work until the Contractor presents evidence the entities required to countersign such required commitments have done so.

1.4. GENERAL CONTRACTORS RESPONSIBILITIES

A. The General Contractor (GC) shall be responsible to remedy, at his/her expense, any defect in the Work and any damage to City owned or controlled real or personal property when the damage is a result of:
1. The GC's failure to conform to Contract Document requirements.
   a. Any substitutions not properly approved and authorized may be considered defective.
2. Any defect in workmanship, materials, equipment, or design furnished by the GC or Sub-contractors.

B. All warranties as described in this specification and these Contract Documents shall take effect on the date established by the CPM, as noted in Section 1.3F above.
1. All warranties shall remain in effect for one (1) year thereafter unless specifically stated otherwise in the Contract Documents or where standard manufacturer warranties are greater.

C. The GC's warranty with respect to Work repaired or replaced, including restored or replaced Work due to damage, will run for one (1) year from the date of Owner Acceptance of said repair or replacement.
1. This shall be regardless of any benefit the Owner may have had from the Work through any portion of its anticipated useful service life.

D. Warranty Response
1. See Section 3.5 of this specification.

PART 2 – PRODUCTS - THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. WARRANTY CHECKLIST

A. All contractors shall be responsible for reviewing the drawings and specifications within their Divisions of Work to provide a complete and comprehensive list of all Warranty Requirements to the GC.

B. Each list shall indicate the title (and plan identifier when applicable) of the warranted item, the associated specification of the warranted item, the terms of the warranty (years), and a column to verify the item has been turned in and completed.

C. The GC shall be responsible for all of the following:

1. Consolidating all the warranty lists into one master Warranty Checklist.
   a. The checklist shall be in a tabular data format similar to the sample below.
2. Upload the completed checklist to the Submittal Library on the Project Management Web Site for review. See Specification 01 33 23 Submittals for more information on this procedure.
3. Resubmit the schedule as needed after initial reviews have been completed.

D. The GC shall work with all contractors to amend the Warranty Checklist throughout the execution of the project based on changes and modifications as necessary.

Title	Specification	Terms	Completed
Overhead Door Operator	08 36 00	MFR 2yr	
Exterior Bench and Trash Receptacles	12 93 00	MFR 3 year warranty on finish	
Kitchen Sink (SK-1)	22 42 00	MFR 5 year	
Disposal (D-1)	22 42 00	MFR 7 year parts and in-home service	
Toilet (WC-1)	22 42 00	MFR 1 year limited	

3.2. LETTERS OF WARRANTY

A. All letters of warranty shall be in a typed letter format and provide the following information:

1. The letter shall be on official company stationary including company name, address, and phone number.
2. Indicate project name, contract number, and contract address the warranty is for on the reference line.
3. Provide a description of the warranty(ies) being provided.
   a. Include Division, Trade, or Specification information as necessary.
   b. Only combine warranties of related Divisional Work together. Create new letters for additional Divisions as necessary.
4. Indicate the effective Warranty Date. As noted in Section1.3.F above, the Warranty Date shall be the date the Certificate of Substantial Completion was signed by the City Engineer.
5. Contractor Letters of Warranty shall only be signed by a principal officer of the company.
6. After signing the letter provide the GC with a high quality color scanned image in PDF format and the original signed letter.

B. The GC shall be responsible for the Final Warranty submittal as identified in Section 3.4 below.

C. The GC shall obtain letters of warranty from all of the following:

1. The General Contractor shall provide warranty letters for all Work that was self performed under the contract documents, identify all trades or Divisions of Work.
2. All Sub-contractors shall provide warranty letters for Work performed under the contract documents; identify all trades or Divisions of Work.
3. Suppliers, as required by other specifications within the Construction Documents where the manufacture of a specific product unique to the Work of this contract was required.
   a. The terms and conditions of the Supplier Letter of Warranty shall be as defined by the specifications associated with the Work but shall not be less than the industry standard of repair, or replace defective materials and workmanship within one (1) year of the warranty date.
   b. When the supplier is also the installer a single written letter may be submitted identifying both the warranty for the manufacture of the product and the warranty for the installation of the product.
4. Installers as required by other specifications within the Construction Documents where the installation of a specific product unique to the Work of this contract was required.
   1. The terms and conditions of the Installer Letter of Warranty shall be as defined by the specifications associated with the Work but shall not be less than the industry standard of repair,

or replace defective materials and workmanship associated with the installation of the product within one (1) year of the warranty date.

5. Special Letters of Warranty shall be required from any contractor, supplier, installer or manufacturer who agrees to provide warranty services required by any Division Specification in excess of their Standard Product Warranty.

3.3. STANDARD PRODUCT WARRANTY

A. All contractors shall be responsible for collecting and providing copies of all standard product warranties for commercially available products purchased and installed under this contract.

B. Only one copy of the manufacturers' standard warranty needs to be submitted as representative for all quantities of the same model number used throughout the Work.

C. Provide the manufacturers certificate, letter, or other standard documentation for each Standard Product Warranty submitted as follows:

1. Whenever possible a PDF version of the document shall be used.
    a. If a PDF version is used all additional information shall be completed using simple PDF editing tools such as text boxes, highlight, etc.
    b. If a PDF version is not available and an original document is furnished the additional information shall be neatly hand written and highlighted on the document in such a fashion so that it does not obscure any part of the written warranty.
2. Provide the following additional information on each warranty document:
    a. Contract warranty date.
    b. Provide the manufacturer name and model number of the product if not specified within the warranty.
        i. Where the manufacturer name and model number is specified within the warranty it shall be highlighted for visibility.
    c. Provide the plan identifier (LAV-1, WC-2, etc) when applicable.

D. Each completed warranty shall be saved as a digital PDF. The file shall be named using the specification number and item description. I.E. 22 42 00 Toilet (WC-1).pdf
    a. Where an original certificate was furnished provide a high quality colored scan of the completed document with the additional information. Save the scanned image in PDF format and use the same naming convention as indicated above.

E. Provide all PDF files and any original documents to the GC for final consolidation to be provided to the Owner.

3.4. FINAL WARRANTY SUBMITTAL

A. The GC shall receive all required warranties (digital PDF and any original documents) from all contractors, suppliers, installers and manufacturers.

B. The GC shall inventory all received warranties with the Warranty Submittal List to ensure all required warranties have been received and all warranty periods are correct according to the specifications.

C. Provide with each Operation and Maintenance Manual a complete copy of any associated warranty.

D. Scan all warranties into a single organized electronic PDF file as follows:
1. Organize the PDF file into an orderly sequence based on the table of contents of the Specifications.
2. Provide a typed Table of Contents for the entire file at the front of the document.
3. Provide bookmarks and links to each individual PDF to enable quick navigation through the PDF document.

E. Upload the warranty submittal to the appropriate document library on the Project Management Web Site for review by the PA and CPM.

F. Correct any deficiencies or omissions and resubmit as necessary.

3.5. WARRANTY NOTIFICATION, RESPONSE, EXECUTION AND FOLLOW-UP

A. Warranty Notification:
1. The City of Madison, Project Management Web Site, uses an email notification system for all warranty related issues. The GC will be required to provide, and keep current during the warranty period, a minimum of two (2) email addresses and phone numbers of current employees to receive email notifications and provide response regarding Work associated with these construction documents.
    a. In the event a Warranty Issue is deemed by the City of Madison to be an emergency, the GC shall first receive a phone call with a follow-up email from the Project Management Web Site.
    b. The Contract Closeout-Warranty Issue Library on the Project Management Web Site uses a form for each warranty issue that is logged into the system.

i. The GC shall open each warranty issue form, review the issue description and any attached documentation or photos.
ii. The GC shall also notify any other sub-contractor, supplier, or installer that may be required to review the warranty issue.

B. Warranty Response:
1. The GC shall upon notification by the City of Madison provide warranty response as follows:
a. Critical Systems or equipment: Where damage to equipment and other building components, or injury to personnel is probable provide immediate emergency shut-down information and an on-site response team as soon as possible but in no case shall on-site response exceed 24 hours.
b. For non-critical responses where damage or injury is unlikely provide on-site response no later than the next business day.
c. Where Technical Assistance support is part of the written warranty provide all assistance necessary via phone, text, or internet systems as indicated by the warranty. If issues cannot be resolved provide on-site response no later than the next business day.
d. If the request cannot be supported in sufficient time as outlined above the Owner (or Owner Representative) reserves the right to contact other contractors or service companies having similar capability to expedite the repair or replacement and shall invoice all associated costs to the Owner back to the GC.

C. Warranty Execution:
1. The GC shall provide all repairs or replacements as necessary to restore broken or damaged Work to the original level of acceptance as intended by the Contract Documents.
a. Provide all materials, equipment, products, and labor necessary to complete the repair or replacement associated with the Warranty Issue.
b. Provide all cleaning services as may be required before, during, and after the repair or replacement as per Specification 01 74 13 Progress Cleaning.
c. Provide any protection necessary for existing construction as per Specification 01 76 00 Protecting Installed Construction
d. Provide new letters of warranty when required.

D. Warranty Follow-up:
1. Logged Warranty Issues:
a. The GC shall provide complete documented responses of all logged Warranty Issues. Responses shall provide a description of work completed, by who, inclusive dates, and photos of completed or repaired work.
i. Provide call back response if work is not acceptable.
b. The City Project Manager shall review the submitted response documentation and do a field inspection if necessary.
i. If work is not acceptable, contact GC to review details and expectations of the repair as needed.
ii. If work is acceptable close the Warranty Issue.
2. Quarterly Warranty Reviews:
a. The GC shall be responsible for scheduling quarterly on-site review with all of the following:
i. City Project Manager, and other City staff as needed
ii. Owner and Owner Tenant Representative
iii. Commissioning Agent (CxA)
iv. Plumbing, Heating, Electrical Sub-contractors
v. Other Sub-contractors that may be responsible for open Warranty issues
b. Quarterly reviews shall be scheduled at 3 months, 6 months, and 11 months after the effective date of the warranty. The review meetings shall:
i. Review the status of all open Warranty Issues, determine course of action and estimated date of completion.
ii. In the appropriate quarter, provide shut-down, start-up, testing, and training of off-season equipment as required by the contract documents.
iii. The 11th month review shall review all open Warranty Issues, final plan for resolution, and all Warranty Issues where a new letter of warranty may have been issued.

END OF SECTION

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SECTION 01 78 39
AS-BUILT DRAWINGS

PART 1 – GENERAL

1.1. SUMMARY

A. This specification is intended to provide clear guidelines and identify the responsibilities of all contractors as they pertain to City of Madison contract procedures regarding the accurate recording of the Work associated with the execution of this contract. This shall include but not be limited to work that will be hidden, concealed, or buried.

B. Each contractor shall be responsible for maintaining an accurate record of all installations, locations, and changes to the contract documents during the execution of this contract as it may relate to their specific division or trade.

C. The General Contractor (GC) shall be responsible for ensuring all contractors provide as-built record information to the Master As-Built Document Set as described in this specification.

1.2. RELATED SPECIFICAITONS

A. 00 31 21 Survey Information
B. 01 26 13 Request for Information
C. 01 31 23 Construction Bulletin
D. 01 32 33 Photographic Documentation
E. 01 26 63 Change Orders
F. 01 29 76 Progress Payment Procedures
G. 01 31 23 Project Management Web Site
H. 01 33 23 Submittals
I. 01 77 00 Closeout Procedures
J 01 91 00 Commissioning
K. Other Divisions and Specifications that may address more specifically the requirements for field recording the installation of all items associated with the execution of this contract by Division or Trade.

1.3. RELATED DOCUMENTS

A. Other related documents shall include but not be limited to the following:
1. Bidding documents including drawings, specifications, and addenda.
2. Required regulatory documents of conditional approval.
3. Field orders, verbal or written by inspectors having regulatory jurisdiction.
4. Shop drawings and installation drawings.

1.4. PERFORMANCE REQUIREMENTS

A. The GC shall be responsible for maintaining the “Master As-Built Document Set” in the job trailer at all times during the execution of this contract. This document set shall include all of the following:
1. Master As-Built Plan Set
2. Master As-Built Specification Set
3. Other Document Sets

B. The GC shall designate one person of the GC staff to be responsible for maintaining the Master As-Built Document Set at the job trailer. This shall include, posting updates, revisions, deletions and the monitoring of all contractors posting as-built information as described in this specification.

C. All contractors shall use this specification as a general guideline regarding the requirements for documenting their completed Work. Contractors shall explicitly follow additional specification requirements within their own Division of Trade as it may apply to this specification.

1.5. QUALITY ASSURANCE

A. The GC shall be responsible for all of the following:
   a. Spot checking all sub-contractors field documents to insure daily information is being recorded as work progresses.
   b. Discuss as-built recording to the plan set at weekly job meetings with all sub-contractors on site.
   c. Schedule time with sub-contractors in the job trailer for recording as-built information to the plan set.
   d. Insure that all sub-contractors are providing clear and accurate information to the plan set in a neat and organized manner.
   e. Insure sub-contractors who have completed work have finalized recording all as-built information to the plan set before releasing them from the project site.

B. The Project Architect, the City Project Manager, Commissioning Agent and other design team staff will perform random checks of the Master As-Built Document Set during the execution of this contract to ensure as-built information is being recorded in a timely fashion as the Work progresses. An updated and current Master As-Built Document Set is a stipulation for approval of the progress payment.

PART 2 – PRODUCTS

2.1. OFFICE SUPPLIES

A. The GC shall provide a sufficient supply of office products in the job trailer at all times for all contractors to use in recording as-built information into the plan set. This shall include but not be limited to the following:
   a. Red ink pens, medium point. Pens that bleed through paper, markers, and felt tips will not be accepted.
   b. The use of highlighters is acceptable. Assign colors to various trades for consistency in recording information.
   c. Straight edges of various lengths for drawing dimension, extension and other lines.
   d. Civil and Architectural scales
   e. Clear transparent, non-yellowing, single sided tape.
   f. Correction tape or correction fluid for correcting small errors.

PART 3 - EXECUTION

3.1. FIELD DOCUMENT AS-BUILTS

A. The GC and all Sub-contractors shall be responsible for keeping their own field set of as-built documents including plans, specifications and published changes.

B. Field sets shall be kept dry and in good condition at all times.

C. No Work shall be buried, covered, or hidden, by any additional Work, regardless of Contractor or Trade, until locations of all materials and equipment has been properly documented as described below.

D. All contractors shall be required to record the following as-built information:
   a. Notes on the daily installation of materials and equipment.
   b. Sketches, corrections, and markups indicating final location, positioning, and arrangement of materials and equipment such as pipes, conduits, valves, cleanouts, pull boxes and other such items. Note all final locations on plan sheets, indicate dimension off identifiable building features. Riser diagrams need only be corrected for significant changes in locations, routing or configuration.
      i. The use of photographs in lieu of hand drawn sketches is acceptable.
      ii. Photos shall be taken according to Specification 01 32 33 Photographic Documentation
      iii. Print photo and markup with dimensions or notes as necessary.
   c. Identify by the use of existing plan symbology and notes the size, type, quantity, and use as applicable of materials such as pipes, valves, conduits, etc.

d. Note whether horizontal runs are below slab or above ceiling, include dimensions above or below finished floor elevation.

E. All contractors shall be responsible for transferring the information from their field set of documents to the Master As-Built Plan Set kept in the GC job trailer. See Section 3.3.D. below for the proper procedure.

F. All contractors shall update the GC Master Plan Set as often as necessary, but not less than once per work week.

3.2. SITE SURVEY AS-BUILT

A. The Land Surveyor Sub-Contractor shall provide digital as-built information including but not be limited to the following:

a. For underground buried utility laterals and services of all types locate all of the following that may apply:

i. Connection points at all mains
ii. Storm discharge points to open air
iii. All corners and bends regardless of angle, large radius sweeps shall have multiple point locations sufficient to define the sweep.
iv. All vertical drops
v. All wells
vi. Private buried utilities such as buried electrical cables, irrigation systems, etc.
v. Other information that may need to be located in the future by the owner prior to digging

b. Record all surface features including but not limited to the following:

i. Building corners, pavement edges, and other permanent structural features.
ii. All surface covers for inlets, catch basins, cleanouts, access structures, curb stops and other such devices.
iii. Other permanent surface features such as hydrants, lamp posts, and other permanent site amenities.

c. The following data shall be recorded while locating items in sub-sections 3.2.a and 3.2.b above:

i. Flow lines at both ends of pipes
ii. Pipe sizes and material types
iii. Rim elevations for all covers
iv. Sump elevations and invert elevations of all structures
v. Spot elevations for all pads, driveways, walks, stoops, and floors

B. The Surveyor shall provide the final digital as-built on a media and in a format specified in Specification 00 31 21 Survey Information to the GC for turn in to the Project Architect and the Civil Engineer.

C. The Surveyor shall provide two printed as-built site plans to the GC for inclusion in the Master As-Built Plan Set as follows:

1. One sheet to show all features (but not contour information) with text neatly organized for each item identified.
2. One sheet showing contours, contour labels, and features from item 1 above, but with no additional text.

3.3. MASTER AS-BUILT DOCUMENT SET

A. The GC shall be responsible for maintaining the Master As-Built Document Set in the job trailer at all times.

1. The Master As-Built Plan Set (Plan Set) shall begin with one complete bid set of drawings and any additional sheets that were supplied by published addenda during the bidding process. The cover sheet shall be titled as the “Master As-Built Plan Set” in large bold red letters approximately 2” in height and shall not be used for any other purpose.

a. The Plan Set shall be kept dry, legible, and in good condition at all times.

b. The Plan Set shall be kept up to date with new revisions within two (2) working days of supplemental drawings being issued. Revisions shall be posted as follows:

i. Insert new, revised sheets into the plan set. Void old sheets but do not remove them from the plan set. Indicate date received and what document (RFI, CB, CO, etc) caused the change.
ii. Insert new, revised individual details into the plan set. Void old details, tape new details over the old details with a “tape hinge” to allow them to be viewed. Indicate date received and what document (RFI, CB, CO, etc) caused the change.
iii. Add new details in appropriate white space on relevant sheets. If no space is available use the back side of the previous sheet or insert a new sheet. Indicate date received and what document (RFI, CB, CO, etc) caused the change.

c. The Plan Set shall be available at anytime for easy reference during progress meetings and for emergency location information of new work already completed.

2. The Master As-Built Specification Set (Spec Set) shall begin with one complete bid set of specifications and any additional specifications that were supplied by published addenda during the bidding process. The Spec Set shall be provided in three "D" ring type binders of sufficient thickness to accommodate the specification set. Multiple binders are allowed as necessary. Label the front cover and binding edge with "Master As-Built Specifications" in bold red letters. Provide other information as necessary to distinguish the contents of multi-volume sets.
   a. The Spec Set shall be kept dry, legible, and in good condition at all times.
   b. The Spec Set shall be kept up to date with new revisions within two (2) working days of supplemental drawings being issued.
   c. The Spec Set shall be available at anytime for easy reference during progress meetings.
3. Other Document Sets may be kept at the GCs option in three "D" ring type binders of sufficient thickness to accommodate the documentation. Other documentation sets may include but not be limited to RFIs, CBs, COs, etc.

C. The Land Surveyor Sub-Contractor shall be required to use digital surveying for all exterior site surveying, and provide deliverable digital as-builts as specified in Specification 00 31 21 Survey Information. As soon as practical the surveyor shall provide the GC with a preliminary copy of installed buried utilities for inclusion with the plan set in the job trailer. The surveyor shall provide final digital as builts as per section 3.2 above.

D. All contractors shall be responsible for updating the Plan Set from their field sets at least once per work week. Updates shall include but not be limited to the following procedures:
   a. All updates shall be done only in red ink. Place a "cloud" around small areas of correction to call attention to the change.
   b. Whenever possible place general work notes, field sketches, supplemental details, photos, and other such information on the reverse side of the preceding sheet. Installation notes including dates shall be kept neatly organized in chronological order as necessary.
   c. Accurately locate items on the plan set as follows:
      i. For items that are located as dimensioned provide a check mark or circle indicating the dimension was verified.
      ii. For items that are within 5 feet of the location indicated on the plans leave as shown and:
         - Provide correct dimensions to existing dimension strings or,
         - Accurately locate with new dimension strings
      iii. For items that are more than 5 feet from the location indicated on the plans
         - Accurately draw the items in the new location as installed and,
         - Accurately locate with new dimension strings and,
         - Note that the existing location is void.
   d. Include dimensioned locations for items that will be buried, concealed, or hidden in the ground, under floors, in walls or above ceilings.
      i. Dimensions shall be pulled from identifiable building features, not from centers of columns or other buried features.
      ii. When necessary pull more dimensions as needed from opposing directions to properly locate single items.

3.4. AS-BUILT REVIEW AND ACCEPTANCE

A. The GC shall provide the Master As-Built Plan Set to the Project Architect (PA), the City Project Manager (CPM), the Commissioning Agent (CxA) and other design team staff for content review prior to the Progress Payment Milestone indicated in Specification 01 29 76 Progress Payment Procedures. The submitted plan set shall include the digital survey information produced under Section 3.2 above.
   1. If the plan set is not approved:
      a. The PA and CPM shall only be required to generalize deficiencies by trade there shall be no requirement or expectation to generate a "punch list" of required corrections.
      b. The GC and Sub-contractors as necessary shall be responsible for inspecting the installation and correcting the drawings as needed.
      c. The GC shall re-submit the plan set for review.
   2. If the plan set is approved the PA shall take possession of the plan set to be used in providing the owner with digital CAD record drawings. Upon completion of transferring the information to CAD the PA shall provide the Owner with CAD record drawings, record PDFs, and the Master As-Built Plan Set.

3.5. CHANGES AFTER ACCEPTANCE

A. No Contractor shall be responsible for making changes to the As-Built record documents after acceptance by the PA and CPM except when necessitated by changes resulting from any Work made by the Contractor as part of his/her guarantee.

END OF SECTION

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SECTION 01 78 43
SPARE PARTS AND EXTRA MATERIALS

PART 1 – GENERAL

1.1. SUMMARY

A. This specification is intended to provide clear guidelines and identify the responsibilities of all contractors as they pertain to City of Madison contract procedures regarding spare parts, special tools, special materials, and extra materials.

B. Each contractor shall be responsible for knowing the specific requirements of their Division Specifications as they may relate to the general information provided in this specification.

C. The General Contractor (GC) shall be responsible for ensuring all contractors provide spare parts and extra materials as described in this specification.

1.2. RELATED SPECIFICAITONS

A. 01 29 76 Progress Payment Procedures

B. 01 31 23 Project Management Web Site

C. 01 77 00 Closeout Procedures

D. Other Divisions and Specifications that may address more specifically how to proceed with spare parts, special tools, special materials, and extra materials.

1.3. DEFINITIONS

A. Spare Parts: Any component of a product or assembly that comes pre-packaged or was specially ordered for the explicit use of the product or assembly. This shall include but not be limited to fastening devices, mounting brackets, replacement parts, wheels, pulleys, wiring, alternate assembly pieces, etc.

B. Special Tools: Any tool of any kind that was pre-packaged or specially ordered, and is required to be used for the installation or maintenance of an installed product or assembly as part of this contract.

C. Special Materials: Any oil, lubricant, glue, touch-up paint, or other such material that comes pre-packaged or was specially ordered and is required to be used for the installation or maintenance of an installed product or assembly as part of this contract.

D. Extra Materials (Attic Stock): Any surplus materials in new and useable condition that was installed a part of this contract. Attic Stock shall include but not be limited to the following: ceiling tiles, paint, stain, floor coverings, ceramic tiles, light bulbs/lamps, filters, strainers, etc. Attic Stock shall include partially opened bulk items and additional unopened quantities as directed by other specifications.

1.4. PERFORMANCE REQUIREMENTS

A. All contractors shall be responsible for consolidating spare parts, special tools, special materials, and attic stock as it pertains to the specific Work within their Division or Trade.

B. All contractors shall use this specification as a general guideline regarding the requirements for turning spare parts, special tools, special materials, and attic stock over to the owner. Contractors shall explicitly follow specification requirements within their own Division of Trade.

1.5. QUALITY ASSURANCE

A. The General Contractor (GC) shall be responsible for all of the following:

1. Coordinate the location for and the delivery of all spare parts, special tools, special materials, and attic stock being provided by all contractors under this contract to one centralized location as designated by the Owner.
2. Verify that all items being delivered are:
   a. Clean, new, and in a usable condition.
   b. Properly sealed, protected, and labeled
   c. Properly documented

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. PACKAGING

A. Whenever possible all surplus items should remain in their original packaging such as parts envelopes.
B. Package small parts in re-sealable plastic bags (Ziploc) or envelopes with clasp fasteners. Do not use envelopes that seal with glue or tape envelopes closed. Do not leave packaging unsealed.
C. Package like parts together for products or assemblies. I.E. keep all spare parts for flushometers together.
D. Many small packages may be grouped together into a larger container by trade.
E. Do not use unrelated boxes or containers for packaging spare items. I.E. do not use a light fixture box for spare breakers, or flushometers parts.

3.2. LABELING

A. Whenever possible the original labeling indicating part numbers and other pertinent information shall remain on the original packaging.
B. If original labeling is not available the contractor shall label all parts and packages using tape or labels and permanent black markers. Tape or labels being used shall absorb the permanent marker without bleeding or allowing ink to be smeared or rubbed off.
C. Labels shall include the name of the product or equipment the item belongs to, part number and/or name, and any other information that would assist maintenance personnel in identifying the piece and related product.
D. Labels shall include plan or specification designations (WC-1, LAV-3, DF-2, CPT-1, etc) that identify the particular product or finish material it represents.
E. Labels for parts stored in clear re-sealable plastic bags may be placed inside the bag. Label shall face out and be able to be read from one side. Multiple bags shall be numbered individually for identification.
F. Label the outside of large containers with the trade name (Plumbing, Electrical, etc).

3.3. INVENTORY

A. All contractors shall provide the GC with complete inventories of all spare parts, special tools, special materials, and attic stock that they are providing at the end of the contract. The inventories shall be organized as follows:
   1. The cover sheet shall indicate the Contractors name, address, phone number, identify that the document is the “Spare Parts and Extra Materials Inventory”, and identify the Division or Trade the inventory is for.
   2. Provide an inventory in a tabular format of all items being provided under this and other specifications. The minimum information to be provided for each item on the inventory shall be as follows:
      a. Bag or container number, all items of one bag or container shall be grouped together on the inventory
      b. Item description
      c. Item size (if applicable)
      d. Total quantity provided
      e. Identify if item is a spare part, tool, special material, or attic stock
B. The GC shall consolidate inventories from all sub-contractors into one tabular data sheet organized by Division or Trade of Work.
   1. Upon completing the consolidated list the GC shall upload the completed inventory to the Contract Closeout-Attic Stock Library on the Project Management Web Site.
   2. The GC shall notify the Project Architect and City Project Manager that the scans have been uploaded.
   3. Consulting Staff and Owner Staff shall review the inventories prior to Final Review to verify that minimum required quantities have been met. Deficiencies shall be noted and returned back to the GC for corrective action.

3.4. STORAGE

A. Prior to the 80% Progress Payment milestone the GC shall coordinate with the City Project Manager and Maintenance Personnel where spare parts, special tools, special materials, and attic stock shall be stored.

B. The GC shall instruct all contractors as to the location and proper storage procedures.

C. The GC shall be responsible for ensuring the storage area is kept neat and orderly as follows:

1. Like items are stored together by material, product, or trade as necessary.
2. Liquids are stored in sealable containers and the lids have been properly installed to prevent drying out, spillage, etc.
3. All labels are clearly visible and provide the required information.

D. Large items shall be stored so as not to damage other items. Do not stack heavy items or items with distinct shapes/outlines on softer items that may get crushed or imprinted.

3.5. CLOSEOUT PROCEDURE

A. Prior to the 90% Progress Payment milestone the GC shall review all attic stock already stored by the contractors to ensure the following:

1. Materials are stored in the proper location(s).
2. All boxes, containers and items are properly labeled according to the submitted/approved inventory.
3. Quantities are correct according to the submitted/approved inventory.

B. The GC shall ensure that all deficiencies are corrected prior to conducting Demonstration and Training Sessions.

C. The GC shall review with Maintenance Staff all inventories and labeling during the scheduled Demonstration and Training Sessions.

D. Any discrepancies associated with Attic Stock shall be resolved and verified prior to the CPM releasing the 90% CT progress payment.

END OF SECTION

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SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 – GENERAL

1.1. SUMMARY

A. The purpose of this specification is to provide clear responsibilities and guidelines related to providing Demonstration and Training (D&T) Sessions related to general facility use, equipment, systems, finishes, and materials to City of Madison Staff (Owner, Owner Representatives, Maintenance, and Custodial Personnel) as needed.

B. All D&T shall be coordinated through the General Contractor (GC), Project Architect (PA) and City Project Manager (CPM), and will be based on or customized to the needs of City of Madison Staff being trained. New equipment and systems may have complete D&T sessions as described in this specification while equipment or systems staff is familiar with may have sessions more focused on maintenance only.

1.2. RELATED SPECIFICATIONS

A. Section 01 29 76 Progress Payment Procedures
B. Section 01 78 13 Completion and Correction List
C. Section 01 78 19 Maintenance Contracts
D. Section 01 78 23 Operation and Maintenance Data
E. Section 01 78 36 Warranties
F. Section 01 78 39 As-Built Drawings
G. Section 01 78 43 Spare Parts and Extra Materials
H Section 01 91 00 Commissioning
I. Other Divisions and Specifications that may address more specifically the requirements for D&T sessions related to the installation of all items and equipment installed under the execution of the Work.

1.3. QUALITY ASSURANCE

A. All contractors shall have the responsibility of preparing for and conducting D&T sessions as determined by this and other Division or Trade related specifications, Owner Operation and Maintenance Manuals, and other such documentation related to the Work.

B. The GC shall have responsibility for:

1. Ensuring that all contractors required to conduct a D&T session have successfully completed all of the following:
    a. Turned in all required documentation for review and documentation has been approved/accepted prior to scheduling D&T sessions.
    b. Other required documentation as needed is available and ready for use during the D&T session.
    c. All systems have been started, tested, and running as per appropriate specification and/or manufacturers recommendations prior to scheduling D&T sessions.
    d. All contractors are sufficiently prepared for their D&T session
    e. Documents the D&T session including date, time, contractor and company name, attendees and other information regarding the session
2. Organizing the coordination and scheduling of all D&T sessions between all contractors and the appropriate representatives of the Owner. These representatives may include any of the following depending on the Work of the Contract:

a. Owner – end users
b. Facility Maintenance personnel
   i. Facility general operation procedures including custodial services
   ii. Electrical
   iii. Mechanical
   iv. Plumbing
   v. Site
c. Information Technology (IT) Department
d. Traffic Engineering – Radio Shop
e. Architects, Engineers and Facility Management staff as project completion overview

PART 2 – PRODUCTS – THIS SECTION NOT USED

PART 3 - EXECUTION

3.1. GENERAL REQUIREMENTS

A. The GC shall develop a specific D&T plan to be scheduled and conducted as described below but no sooner than the meeting discussed in 3.2.A.2 below.

C. The GC shall not schedule D&T sessions to preclude required personnel from attending multiple sessions.

3.2. COORDINATING AND SCHEDULING THE TRAINING

A. The GC, PA, CxA and CPM, shall review all Training and Demonstration requirements during two (2) special meetings.
   1. The first meeting shall be held at the 50% Contract Total Payment. During this meeting the following shall be discussed:
      a. Preliminary schedule of training dates to be completed prior to beginning construction closeout.
      b. List of documentation and items that need to be completed and available before and during the training session.
      c. Who (Owner, Maintenance, etc) will be attending what training session(s).
   2. The second meeting shall be held at the 80% Contract Total Payment. This meeting shall review due outs that have not yet been completed for the 90% Contract Total Payment and the requirements necessary for Construction Closeout. All Demonstration and Training sessions shall be completed prior to receiving the 90% progress payment and beginning Construction Closeout Procedures (see Specification 01 77 00).
      a. This does not include any requirement associated with off season equipment preparation and/or demonstration and Training Sessions.

B. All of the Construction Work shall be operationally ready prior to conducting training as follows:
   1. All contractors shall have their As-Built Drawing Records available for reviewing locations of system components during training.
   2. All <u>final and approved</u> Operations and Maintenance Data shall be completed no less than two (2) full weeks prior to the scheduled training.
   3. All systems shall have been started, functionally tested, balanced, and fully operational, and all piping and equipment labeling complete at least two (2) days prior to the scheduled training.
      a. Seasonal equipment shall not be trained out of season. Contractors having seasonal equipment shall work with the GC and CPM for coordinating additional training sessions as appropriate for seasonal equipment.

C. Correction list items that prevent a piece of equipment or system from being fully operational for training shall be corrected prior to conducting the training.

3.3. TRAINING OBJECTIVES

A. For each piece of equipment or system installed train on the following objectives/topics as applicable:
   1. System design, concept, and capabilities
   2. Review of related contractor as-built drawings
   3. Facility walkthrough to identify key components of the system
   4. System operation and programming including weekly, monthly, annual test procedures
   5. System maintenance requirements
   6. System troubleshooting procedures
   7. Testing, inspection, and reporting requirements associated with any regulatory requirements
   8. Identification of any correction list items still outstanding

9. Review of system documentation including the following:
    a. Operation and maintenance data
    b. Warranties
    c. Valve charts, tags, and pipe identification markers

B. For each piece of specialty equipment train on the following objectives/topics as applicable:
1. Manufacturers operations instructions
2. Manufacturers use and care instructions
3. Manufacturers maintenance and troubleshooting instructions
4. System operation and programming including weekly, monthly, annual test procedures
5. Identification of any correction list items still outstanding
6. Review of system documentation including the following:
    a. Operation and maintenance data
    b. Warranties

C. End User Orientation
1. Facility walkthrough
2. Security and emergency features
3. General facility operation procedures

D. Facility General Use and Custodial Services – if requested
1. Facility walkthrough
2. Security and emergency features
3. General facility operation procedures
4. Care and maintenance of specialty items, finishes, etc as requested
5. Attic stock inventory and material designations

3.4. DEMONSTRATION AND TRAINING PROGRAM PREPARATION

A. Each contractor having a responsibility for providing D&T sessions shall meet with the GC, CPM, and other City Staff as needed to review the extent of the Training Objectives in section 3.3 above needed for each piece of equipment, system, finish, etc. This meeting shall occur no less than four (4) weeks prior to the anticipated training session.

B. The contractor shall use the information from item 3.4.A above to prepare a formal training program for each piece of equipment or system based on the Training Objectives in 3.3 above.
1. The formal training program shall include the following information:
    a. Session title
    b. List of systems, equipment, use, care, etc to be covered during the session
    c. Provide the following for each systems, equipment, use, care, etc to be covered during the session
        i. Name and affiliation of each instructor to be used. As needed and discretion of the Owner the GC to require attendance by the installing technician, installing Contractor and the appropriate trade or manufacturer's representative.
        ii. Qualifications of each instructor to be used. Practical building operation expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment as installed in this project is required by the training personnel. If Owner determines training was not adequate, the training shall be repeated until acceptable to Owner.
        iii. A checklist of all documentation and system/equipment requirements necessary to complete a successful training session and the current status of each
        iv. Any additional documents, training aids, video or other items to be used to complete the training
        v. Any special requirements or needs associated with item iv above to complete the training
    d. The intended audience for the training
    e. The approximate duration of each objective or topic to be covered
2. Submit the completed training program to the GC for review and approval by the PA and CPM.

C. The PA and CPM shall work with staff as necessary to ensure all points of anticipated training needs have been met. The PA and CPM will approve the program as submitted or recommend changes for re-submittal as necessary.

3.5. CONDUCTING A DEMONSTRATION AND TRAINING SESSION

A. All contractors shall conduct their required D&T Sessions as follows:
1. Begin with a classroom session
    a. Provide a sign in sheet indicating all training to be conducted, instructors, etc.

b. Provide an overview of the training to be conducted including the approximate schedule.

2. Conduct a general walk-through of the site.
   a. Point out locations of various equipment, valves, charts, and other related items.
   b. Use the Division or Trade As-Built record drawings to indicate locations of hidden or buried items.
3. Provide a demonstration of general equipment/system operation including using the O&M manual.
   a. Startup and shutdown procedures.
   b. Normal operational levels as depicted by any gauges, software, etc.
   c. Indicate warning devices, signs etc. and demonstrate emergency shut-down procedures.
4. Provide a demonstration of all owner level maintenance using the O&M manual.
   a. Indicate frequency of maintenance.
   b. Provide and review all spare parts, special tools, and special materials.
5. Provide and review all spare parts, special tools, special materials, or attic stock as applicable.
6. While conducting D&T sessions:
   a. Allow hands on training whenever practical.
   b. Answer questions promptly
   c. Repeat demonstrations and procedures as necessary.

B. Within two (2) working days of completing the D&T session the contractor responsible for the session shall turn-in any documentation generated including the sign in roster to the GC.

C. The GC shall turn over all training documentation to the PA and CPM upon completion of D&T sessions.

D. Re-schedule any training that has been determined to be inadequate or inappropriate for any reason including but not limited to any of the following;
   1. Unqualified instructor
   2. System installation incomplete or untested to the specifications
   3. Equipment failure during demonstration
   4. Un-expected cancellation

3.6. CLOSEOUT PROCEDURE

A. Prior to receiving the 90% Progress payment the GC shall:
   1. Verify with the PA and CPM that each Demonstration and Training Session was conducted properly and according to the submitted plan.
   2. Any required “Off Season” equipment testing, balancing, and Demonstration and Training Sessions have been tentatively scheduled with the GC, necessary sub-contractors, instructors and Owner/Owner Representatives as necessary.

END OF SECTION

SECTION 01 88 15

EXTERIOR WALL ASSEMBLIES - CONSTRUCTION FIRE PERFORMANCE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittals that validate products selected by Contractor for use in exterior wall assemblies.

1.2 RELATED SECTIONS

A. Refer to Division 03, Division 04, and Division 07 Sections that define components of exterior wall assemblies.

1.3 QUALITY ASSURANCE

A. Comply with requirements of NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load Bearing Wall Assemblies containing Combustible Components.

1.4 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria, and product limitations. Include Test Reports for wall assemblies that show compliance with the acceptance criteria of NFPA 285. Technical Evaluation Reports and/or Extension Reports (EEVs) may be submitted for review during permit review process.

PART 2 PRODUCTS

2.1 GENERAL

A. Exterior Wall Assemblies are based on the following:

1. Brick Veneer: Jensen Hughes Project No. 1JJB00090.000.
2. Precast Concrete Panel (Veneer): Jensen Hughes Project No. 1JJB00090.000.
3. Metal Veneer: Jensen Hughes Project No. 1JJB00090.000.

B. All products selected for use by Contractor in the exterior wall assembly shall be listed in the Test Report or Technical Evaluation Report/Extension Report. Products not listed shall be rejected.

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 01 91 00
COMMISSIONING

PART 1 – GENERAL

1.1. SUMMARY

A. Purpose: Define the responsibilities of the parties involved and the procedures related to the commissioning process

1.2. RELATED SPECIFICATIONS

A.	Section 01 31 13	Project Management and Coordination
B.	Section 01 31 19	Project Meetings
C.	Section 01 31 23	Project Management
D.	Section 01 32 26	Construction Progress Reporting
E.	Section 01 33 23	Submittals
F.	Section 01 45 16	Field Quality Control
G.	Section 01 77 00	Closeout Procedures
H.	Section 01 78 23	Operation and Maintenance Data
I.	Section 01 78 39	As-Built Drawings
J.	Section 01 79 00	Demonstration and Training
K.	Section 01 81 13	Sustainable Design Requirements
L.	Section 01 95 00	Measurement & Verification
M.	Section 23 05 93	Testing, Adjusting, and Balancing for HVAC
N.	Section 23 09 00	Instrumentation and Control for HVAC
O.	Section 23 09 23	Direct Digital Control (DDC) System for HVAC
P.	Section 23 09 93	Sequence of Operations for HVAC DDC

1.3 REFERENCES

A. ASHRAE Guideline 1.1-2007, “HVAC&R Technical Requirements for The Commissioning Process”.
B. ASHRAE Guideline 0-2005, “The Commissioning Process”.
C. NEBB – Procedural Standards for Building Systems Commissioning.

1.4 DEFINITIONS

A. Acceptance Phase. Phase of construction after startup and initial checkout when functional performance tests are performed.
B. Commissioning Authority (CxA). An independent entity, not otherwise associated with the A/E team members or the Contractor and reports directly to the Owner. The CxA directs and coordinates the commissioning activities.

C. Commissioning Plan (Cx Plan). An overall plan, developed before or after bidding, that provides the structure, schedule and coordination planning for the commissioning process. The Cx Plan is included in the bid documents and is to be reviewed by all contractors before submitting their bid.

D. Contract Documents. The documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, Cx Plan, etc.).

E. Construction Checklist (CC). a list of items to inspect and test equipment and components to verify proper installation of equipment. The CCs are provided by the CxA to the Sub.

F. Datalogging. - Monitoring flows, currents, status, pressures, etc. of equipment using stand-alone dataloggers separate from the control system.

G. Deferred System Performance Tests. SPT's that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that prevent the tests from being performed earlier.

H. Deficiency. A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the Owner's Project Requirements).

I. Factory Testing. Testing of equipment on-site or at the factory by factory personnel with an Owner's representative present.

J. Indirect Indicators. Indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.

K. Manual Test. Using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").

L. Monitoring. Recording parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of control systems.

M. Over-written Value. Writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 75F to 50F to verify economizer operation). See also "Simulated Signal."

N. Owner's Project Requirements (OPR). A document that describes what the Owner and stakeholders want to achieve with this project and what expectations they have of the completed project.

O. Sampling. Reviewing or testing only a fraction of the total number of identical or near identical pieces of equipment.

P. Seasonal Performance Tests. SPT's that are deferred until the system(s) will experience conditions closer to their design conditions.

Q. Simulated Condition. Condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).

R. Simulated Signal. Disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.

S. System Performance Test (SPT). Dynamic testing of entire systems (rather than just components of the system) under full operation.

T. Trending. Monitoring of control points using the building automation system.

1.5 DESCRIPTION

A. General: Commissioning (Cx) is a systematic process of verifying that all building systems perform interactively to meet the Owner's Project Requirements (OPR). This is achieved by beginning in the planning phase with documenting the OPR and continuing through design, construction, acceptance, and the warranty period with verification of performance. The Cx process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, tesTing and balancing, performance testing and training. Cx during the construction phase is intended to achieve the following specific objectives according to the Contract Documents:

1. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
2. Verify and document proper performance of equipment and systems.
3. Verify that O&M documentation is complete.
4. Verify that the Owner's operating personnel are adequately trained.

B. The Cx process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.

C. The commissioning authority (CxA) has no authority to change, modify or direct any work. The CxA can only provide comments and suggestions.

D. Commissioning Plan. The Cx Plan provides guidance in the execution of the Cx process. The CxA will update the Cx Plan regularly as the project progresses. The Drawings and Specifications will take precedence over the Cx Plan.

1.6 RESPONSIBILITIES

A. General Contractor (GC) and Subcontractors (Subs)

1. Construction and Acceptance Phase
   a. Provide assistance to the Construction Manager CM in the coordination of the Cx work by the CxA, and with the CM and CxA ensure that Cx activities are being scheduled into the master schedule.
   b. Provide an updated construction schedule to the CxA any time the schedule changes.
   c. Include the Cx activities in the contract.
   d. Furnish a copy of all submittals and shop drawings pertaining to the commissioned systems for review concurrently with the Architect and Engineers.
   e. Furnish a copy of all construction meeting agendas and minutes to the CxA.
   f. In each purchase order or subcontract written, include requirements for submittal data, O&M data, Cx tasks and training.
   g. GC will ensure that all Subs execute their Cx responsibilities according to the Contract Documents and schedule.
   h. A representative from the GC and each sub associated with the Cx process shall attend the Cx pre- construction meeting and the regular Cx meetings scheduled by the CxA to facilitate the Cx process.
   i. Coordinate and execute the training of Owner personnel.
   j. Prepare O&M manuals, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
   k. Prepare and submit draft forms, including but not limited to start-up procedures, Testing and Balancing (TAB) forms, calibration forms, etc. for review by the CxA before execution.
   l. Submit test reports to the CxA of all tests performed on components and equipment to be commissioned that are not included as part of the Construction Checklist and SPT procedures.
   m. Complete all construction checklist and functional performance test forms as required by the Cx process.
   n. Support the CxA with verification of the completion of construction checklist and functional performance tests as outlined in PART 3.
   o. Complete and inspect all installations. Certify that all components and systems are operating as intended per Contract Documents.
   p. Remedy all deficiencies immediately as they are identified throughout construction.
   q. Demonstrate functionality of all systems and equipment.
   r. Maintain an updated set of record drawings (on a daily basis) on the construction site.
   s. Provide support and instrumentation to verify TAB reports, start-up reports, calibration reports, and any other report pertinent to the commissioned equipment and systems.
   t. Notify the CxA no less than 21 days before all testing, start-up, and training.
   u. Update the CxA on a weekly basis on the progress of the Cx activities.
   v. Submit trend data in electronic format or allow access to trending data by internet connection as requested by the CxA.
   w. Install access points by every sensor such that the sensor can be calibrated without removal (P/T plugs, plugged holes in ducts etc.).
2. Warranty Period
   a. Execute seasonal or deferred functional performance testing, witnessed by the CxA, according to the specifications.
   b. Correct deficiencies and make necessary adjustments to O&M manuals and record drawings for applicable issues identified in any seasonal testing.

B. Equipment Suppliers

1. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
2. Assist in equipment testing per agreements with Subs.
3. Include all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment according to these Contract Documents in the base

bid price to the Contractor, except for stand-alone data logging equipment that may be used by the CxA.

4. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.
5. Review test procedures for equipment installed by factory representatives.

1.7 SYSTEMS TO BE COMMISSIONED

A. The entire Heating, Ventilation and Air Conditioning (HVAC) system (boilers, chillers, pumps, piping and air distribution systems)
B. Building Automation System (BAS) for the HVAC system
C. Domestic Hot Water
D. Building envelope and roofing system as it pertains to HVAC
E. Lighting and Lighting Controls
F. Emergency Power System

PART 2 – PRODUCTS

2.1 TEST INFORMATION

A. All instruments needed to verify sensor readings, component performance, and system performance will be provided by GC and Subs and be available to the CxA. These instruments will not be beyond what the contractors need to complete the work specified in these construction documents. Any data logging equipment required in addition to the BAS will be provided by the CxA.
B. All instruments shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Contract Documents. Refer to specification section 23 05 93- Testing, Adjusting, and balancing for required instrument tolerances.

PART 3 - EXECUTION

3.1 COMMISSIONING TEAM

A. The members of the commissioning team consist of the Commissioning Authority (CxA), the Owner's Project Manager (PM), the designated representative of the Owner's Construction Management team (CM), the General Contractor (GC or Contractor), the architect and design engineers, the Mechanical Contractor, the Electrical Contractor, the TAB Contractor, the Controls Contractor, any other installing subcontractors or suppliers of equipment.
B. Each Cx Team member shall designate one person who is responsible for coordinating the commissioning efforts with the CxA.

3.2 SCHEDULING AND MEETINGS

A. Scheduling. The CxA will work with the other members of the Cx Team according to established protocols to schedule the Cx activities. The CxA will provide sufficient notice to the Cx Team for scheduling Cx activities. The GC will integrate all Cx activities into the master schedule. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the Cx process.
B. The CxA will provide the initial schedule of primary Cx events at the Cx pre-construction meeting. The Cx Plan provides a format for this schedule. As construction progresses more detailed schedules are developed by the CxA. The Cx Plan also provides a format for detailed schedules.
C. Pre-Construction Meeting. Within 60 days of selection of the GC, the CxA will schedule, plan, and conduct a Cx pre-construction meeting with the entire Cx team in attendance. Meeting minutes will be distributed to all parties by the CxA. Information gathered from this meeting will allow the CxA to revise the Cx Plan which will also be distributed to all parties.
D. Meetings. The Cx meetings will be scheduled approximately once a month during construction. These meetings will be scheduled directly before or after the regular construction meetings if practical. These meetings will cover coordination, deficiency resolution and planning issues with particular Subs. The CxA will plan these meetings and will minimize unnecessary time being spent by Subs

3.3 REPORTING

A. The CxA will provide regular reports to the Owner as construction and Cx progresses. Standard forms are provided and referenced in the Cx Plan.

B. The CxA will regularly communicate with all members of the Cx team, keeping them apprised of Cx progress and scheduling changes through memos, progress reports, etc.

C. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.

3.4 RECORD DRAWINGS

A. The CxA will verify that the record drawings are updated throughout the construction. If a discrepancy is found between the record drawings and the installations, the CxA will notify the GC immediately. It is the GC and subcontractors responsibility to then inspect the installations and immediately and completely update the record drawings such that they accurately reflect the installation.

3.5 CONSTRUCTION COMMISSIONING PROCEDURES

A. The following procedures apply to all equipment to be commissioned.

B. General. Construction checklists are important to ensure that the equipment and systems are hooked up and operational. It ensures that system performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full checkout. No sampling strategies are used. All construction checklists for a given system must be successfully completed prior to formal system performance testing of equipment or subsystems of the given system.

C. Construction Checklists.

1. The primary purpose of the construction checklists is to provide the individual workers with the key criteria for a successful installation. The secondary purpose is to track the progress of the delivery and installation.
2. The CxA will develop construction checklists for all commissioned equipment and distribute these to the responsible contractor. The GC and Subs will review the construction checklists for each equipment type and provide comments to the CxA. The CxA will then print and distribute the construction checklist for each individual component.
3. The GC and Subs are responsible for all requirements in the specification, not only the requirements listed on the checklists.
4. The checklists answer format will be to circle yes /no or provide a brief answer such as providing the model or serial numbers.
5. These checklists are provided by the CxA to the GC. The GC determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form. Each form may have more than one trade responsible for its execution.
6. The construction checklists shall be completed as delivery is completed and the installation progresses.
7. Only individuals who have direct knowledge and witnessed that a line item task on the construction checklist was actually performed shall initial or check that item off. It is not acceptable for supervisors without direct knowledge or who have not witnessed the line item task on the construction checklist to fill out these forms.
8. Any negative response shall immediately be brought to the attention of the CxA. All negative replies shall be explained in detail on the construction checklist.
9. The GC and Subs are responsible for recording the completion of the checklists. Checklists shall be submitted electronically to SharePoint in .pdf format in separate files by Division. Each file shall be bookmarked by checklist tag.
10. Non-itemized installations such as wiring, ductwork, piping etc. will not have checklists to be completed, but the GC and Subs will be provided the key criteria for successful installation.
11. The CxA will verify the construction checklist completion by a sampling of the delivered and installed equipment. The sampling process will be described in the Cx Plan.

D. Sensor Calibration. Calibration of all sensors shall be included as part of the construction checklists performed by the Contractors. Calibration information is provided in specification Section 23 09 23 - Direct Digital Control System for HVAC

E. Deficiencies, Non-Conformance and Approval in Checklists and Startup.

1. The Subs shall clearly list any outstanding items of the construction checklist that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of task completion.
2. The CxA reviews the report and submits either a non-compliance report or an approval form to the Sub or CM. The CxA shall work with the Subs and vendors to correct deficiencies or

uncompleted items. The CxA will involve the CM and others as necessary. The installing Subs or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CxA as soon as outstanding items have been corrected and include a Statement of Correction on the original non- compliance report. When satisfactorily completed, the CxA recommends approval of the completion of the checklists to the CM using a standard form.

3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in back charges to the responsible party.

F. System Performance Tests (SPT). SPTs shall be performed to demonstrate that each system is operating according to the documented OPR and Contract Documents. System testing differs to the tests required in the Construction Checklist in that they facilitate bringing all the individual components together to verify that they operate collectively on a system level to provide the required design conditions.

1. Development of Test Procedures. The CxA shall prepare the SPT forms and procedures in accordance with the criteria defined in the Cx Plan. The GC and Subs shall assist the CxA in the preparation of these procedures by answering queries and forwarding site-specific information. A sample System Performance Test form is provided at the end of this specification section.
2. Participation: The GC and the Subs are responsible for testing all systems to be commissioned such that they function as described in the contract documents. The CxA will verify the performance of the systems. The CxA will direct, witness and document the SPT verification and GC and Subs will execute the verification tests.

G. Problem Solving. The CxA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the GC, Subs and A/E.

H. Seasonal Testing. During the warranty period, seasonal testing (tests delayed until weather conditions are closer to the system's design) shall be completed as part of this contract. The CxA shall coordinate this activity. Tests will be executed, documented and deficiencies corrected by the appropriate Subs, with facilities staff and the CxA witnessing. Any final adjustments to the O&M manuals and record documents due to the testing will be made.

I. Unforeseen Deferred Tests. If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the PM. These tests will be conducted in the same manner as the seasonal tests.

3.6 SENSOR AND ACTUATOR CALIBRATION

A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gages, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

B. Calibrate using the methods described below; alternate methods may be used, if approved by Owner beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Construction Checklist or other suitable forms, documenting initial, intermediate and final results.

C. All Sensors:

1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
2. Verify that sensors with shielded cable are grounded only at one end.
3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F (0.1 degree C) of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
4. Tolerances for critical applications may be tighter.

D. Sensors without Transmitters - Standard Application:

1. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.
2. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is within the tolerances in the table below of the instrument-measured value.
3. If not, install offset, calibrate or replace sensor.

E. Sensors with Transmitters - Standard Application.

1. Disconnect sensor.
2. Connect a signal generator in place of sensor.
3. Connect ammeter in series between transmitter and building automation system control panel.
4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.
5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.

7. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
8. Reconnect sensor.
9. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.
10. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is within the tolerances in the table below of the instrument-measured value.
11. If not, replace sensor and repeat.
12. For pressure sensors, perform a similar process with a suitable signal generator.

F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
1. Watt-hour, Voltage, Amperage: 1 percent of design.
2. Pressure, Air, Water, Gas: 3 percent of design.
3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F (0.2 degree C).
4. Relative Humidity: 4 percent of design.
5. Barometric Pressure: 0.1 inch of Hg (340 Pa).
6. Flow Rate, Air: 10 percent of design.
7. Flow Rate, Water: 4 percent of design.
8. Flow Rate, Steam: 3 percent of design.
9. AHU Wet Bulb and Dew Point: 2.0 degrees F (1.1 degrees C).
10. Hot Water Coil and Boiler Water Temperature: 1.5 degrees F (0.8 degrees C).
11. Cooling Coil, Chilled and Condenser Water Temperatures: 0.4 degrees F (0.2 degree C).
12. Combustion Flue Temperature: 5.0 degrees F (2.8 degrees C).
13. Oxygen and CO2 Monitors: 0.1 percentage points.
14. CO Monitor: 0.01 percentage points.
15. Natural Gas and Oil Flow Rate: 1 percent of design.

G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

H. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
2. Set pump/fan to normal operating mode.
3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
4. Command valve/damper to open; verify position is full open and adjust output signal as required.
5. Command valve/damper to a few intermediate positions.
6. If actual valve/damper position does not reasonably correspond, replace actuator

I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.
1. With full pressure in the system, command valve closed.
2. Use an ultra-sonic flow meter to detect flow or leakage.

3.7 NON-CONFORMANCE

A. All deficiencies or non-conformance issues shall be noted and reported by the GC to the CM on a standard non-compliance form.

B. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.

C. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the CM and the Owner.

D. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.
1. When there is no dispute on the deficiency and the Sub accepts responsibility to correct it:
a. The CxA documents the deficiency and the Sub's response and intentions and they go on to another test or sequence. After the day's work, the CxA submits the non-compliance reports to the CM for signature, if required. A copy is provided to the Sub and CxA. The Sub corrects the deficiency, signs the statement of correction at the bottom of the non-compliance form certifying that the equipment is ready to be retested and sends it back to the CxA.
b. The CxA reschedules the test and the test is repeated.
2. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:

a. The deficiency shall be documented on the non-compliance form with the Sub's response and a copy given to the CM and to the Sub representative assumed to be responsible.
b. Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the A/E. Final acceptance authority is with the Project Manager.
c. The CxA documents the resolution process.
d. Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA. The CxA reschedules the test and the test is repeated until satisfactory performance is achieved.

3. Cost of Retesting.
a. The cost incurred by the Subs to retest a construction checklist item or functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the GC.
b. For a deficiency identified, not related to any construction checklist or start-up fault, the following shall apply: The CxA and CM will direct the retesting of the equipment once at no "charge" to the GC for their time. However, the CxA's and CM's time for a second retest will be charged to the GC, who may choose to recover costs from the responsible Sub.
c. The time for the CxA and CM to direct any retesting required because a specific construction checklist or start-up test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be backcharged to the GC, who may choose to recover costs from the party responsible for executing the faulty installation or test.
d. The Contractor shall respond in writing to the CxA and CM at least as often as Cx meetings are being scheduled concerning the status of each apparent outstanding discrepancy identified during Cx. Discussion shall cover explanations of any disagreements and proposals for their resolution.
e. The CxA retains the original non-conformance forms until the end of the project.
f. Failure Due to Manufacturer Defect. If 10%, or three, whichever is greater, of identical pieces (size alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance spec, all identical units may be considered unacceptable by the CM or PM. In such case, the Contractor shall provide the Owner with the following:
g. Within one week of notification from the CM or PM, the Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the CM or PM within two weeks of the original notice.
h. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated, written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation. The CM or PM will determine whether a replacement of all identical units or a repair is acceptable.
i. Two examples of the proposed solution will be installed by the Contractor and the CM will be allowed to test the installations for up to one week, upon which the CM or PM will decide whether to accept the solution.
j. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items, at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.

E. Approval. The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA and by the CM, if necessary. The CxA recommends acceptance of each test to the CM using a standard form. The CM gives final approval on each test using the same form, providing a signed copy to the CxA and the Contractor.

END OF SECTION

SECTION 01 95 00
MEASUREMENT AND VERIFICATION

PART 1 – GENERAL

1.1 SUMMARY

A. Purpose: This section includes general requirements that apply to implementation of measurement and verification.

B. RELATED WORK AND REQUIREMENTS

1. Section 01 31 13 Project Coordination
2. Section 01 31 19 Project Meetings
3. Section 01 31 23 Project Management Web Site
4. Section 01 91 00 Commissioning
5. Section 23 09 00 Instrumentation and Control for HVAC
6. Section 23 09 23 Direct Digital Control (DDC) System for HVAC
7. Section 23 09 93 Sequence of Operations for HVAC DDC
8. Section 26 24 13 Switchboards
9. Section 26 24 16 Panelboards

1.2 DEFINITIONS

A. BAS - Building Automation System
B. DHW - Domestic Hot Water
C. M&V - Measurement and Verification
D. kW - Electric power read from utility meter
E. KWh - Electric energy consumption read from utility meter
F. Plug Loads – Electric power and consumption from wall receptacles

1.3 MECHANICAL CONTRACTOR RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform M&V activities including, but not limited to, the following:

1. Follow activities identified in the M&V Plan.
2. Coordinate connection of gas and DHW monitoring equipment with BAS.
3. Cooperate with the M&V Provider and Controls Contractor for resolution of issues related to data collection.
4. Attend team meetings during construction and post-construction M&V period (1 year).

1.4 ELECTRICAL CONTRACTOR RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform M&V activities including, but not limited to, the following:

1. Follow activities identified in the M&V Plan.
2. Coordinate connection of electrical monitoring equipment with BAS

3. Cooperate with the M&V Provider and Controls Contractor for resolution of issues related to data collection.
4. Attend team meetings during construction and post-construction M&V period (1 year).

1.5 CONTROLS CONTRACTOR RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform M&V activities including, but not limited to, the following:
1. Follow activities identified in the M&V Plan.
2. Coordinate connection of electrical, gas, and DHW monitoring equipment with BAS
3. Cooperate with the M&V Provider Mechanical Contractor and Electrical Contractor for resolution of issues related to establishing connection between BAS and monitoring meters and equipment.
4. Attend team meetings during construction and post-construction M&V period (1 year).

1.6 M&V PROVIDERS RESPONSIBILITIES

A. Providers responsibilities include:
1. Organize and lead the M&V team.
2. Provide M&V plan.
3. Convene M&V meetings as needed.
4. Cooperate with the Mechanical Contractor, Electrical Contractor, and Controls Contractor for resolution of issues related to establishing connection between BAS and monitoring meters and equipment.
5. Provide an M&V report at 1 year post construction.

PART 2 – PRODUCTS – THIS SECTION NOT USED

2.1 METERS AND SUB-METERS

A. Monitoring meters and sub-meters, both gas and electric, to have the ability to connect to the BAS and provide data to BAS at a minimum of 15 minute intervals. It is acceptable to use the utility for this purpose if allowable by utility company.

PART 3 - EXECUTION

3.1 METER

A. Provide real-time monitoring of the whole building electricity kW and kWh use by using a signal from the building utility meter serving the HVAC, lighting, and plug loads and provide the data input to the Building Automation System (BAS). The BAS must be capable of trending this kW and kWh data. Data is to be collected in 15 minute intervals. Storage of at least 3 months of 15 minute data is required on the BAS. Data older than 3 months is to be automatically saved and archived on the BAS computer without being overwritten. Data older than 5 years can be overwritten. It is the responsibility of the electrical contractor to coordinate this work.

3.2 NATURAL GAS

A. Provide real-time monitoring of whole building natural gas consumption by using a signal from the building utility meter to provide the data input to the BAS. The BAS must be capable of trending gas consumption. Data is to be collected in 15 minute intervals. Storage of at least 3 months of 15 minute data is required on the BAS. Data older than 3 months is to be automatically saved and archived on the BAS computer without being overwritten. Data older than 5 years can be overwritten. It is the responsibility of the mechanical contractor to coordinate this work.

3.3 DOMESTIC HOT WATER

A. Provide real-time monitoring of the domestic hot water (DHW) system by measuring water flow to DHW heater and DHW supply and return temperatures and providing data input to the BAS. The BAS must be capable of trending gas consumption. Data is to be collected in 15 minute intervals. Storage of at least 3 months of 15 minute data is required on the BAS. Data older than 3 months is to be automatically saved and archived on the BAS computer without being overwritten. Data older than 5 years can be overwritten. It is the responsibility of the mechanical contractor to coordinate this work.

3.4 TEMPORARY MONITORING

A. Provide easy access to allow for the temporary installation of split-core current sensors and voltage sensors for the electrical measurement and datalogging on the following systems:

1. Lighting
2. Plug loads
3. HVAC equipment including chillers, fans, circulation pumps, and air handling units
4. DHW equipment

3.5 DDC TRENDS

A. The Controls Contractor is to provide provision for remote access to BAS to view status of building and the ability to download trendable points.

END OF SECTION

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SECTION 02 32 00
GEOTECHNICAL INVESTIGATION

PART 1 - GENERAL

1.1 SUMMARY

A. The following pages include a Geotechnical Investigation of the site.

END OF SECTION

CGC, Inc.

Construction • Geotechnical
Consulting Engineering/Testing

December 15, 2016
C16051-25

Mr. Bill Putnam
City of Madison Parking Utility
PO Box 2986
Madison, WI 53701

Re: Geotechnical Exploration Report
Capital East Parking Ramp
E. Main Street & S. Livingston Street
Madison, WI

Dear Mr. Putnam:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the subsurface exploration for the proposed parking ramp. The purpose of this exploration program was to evaluate the subsurface conditions in the area of the proposed parking ramp and to provide geotechnical recommendations for site preparation, foundation, floor slab and pavement design/construction. We are sending you an electronic copy of this report and can provide a paper copy upon request. We are also sending an electronic copy to the project structural engineer, Mr. Dan Windorski of GRAEF.

PROJECT AND SITE DESCRIPTION

We understand that a new six level parking ramp with commercial space at the north end of the first floor is proposed for the parcel at the southeast quadrant of the intersection of E. Main Street and S. Livingston Street, where project north has E. Main Street as the northern site boundary. The overall footprint will be approximately 264 ft by 196 ft. Estimated maximum column loads (DL+LL) are about 1,100 kips (interior) and 650 kips (exterior). Floor slab loads are expected to be fairly light. We understand finish grade will be lowered about 2 ft below existing grade, so finish floor will likely be near EL 849 to 850 +/- ft.

In order to accommodate and potentially access the three concrete-encased high voltage electrical conduits (owned by ATC) that run below the ramp along the western and southern parts of the site, an access/maintenance tunnel is proposed above the conduit. The current concept for the tunnel involves cast-in-place concrete walls about 3.5 ft outside the conduit that would be supported on grade beams/footings which would be separate from the foundations of the ramp structure. A precast concrete cap would bear on the foundation walls, and the base of the tunnel on either side of the concrete-encased conduits would be compacted stone. Provisions would be provided to dewater the tunnel, if needed, during maintenance operations, as well as ventilate the space.

The site is currently an asphalt and gravel surface MG&E storage yard, with a metal-framed open air structure along the west end of the site and small building along the north end of the site. An apparently

2921 Perry Street, Madison WI 53713
Telephone: 608/288-4100
FAX: 608/288-7887

abandoned railroad spur runs from the north-central part of the site towards the southeast. Based on topographical data from Dane County DCiMap, site topography is fairly flat with grades near EL 850 to 852 ft.

SUBSURFACE EXPLORATION

The subsurface exploration involved drilling eight standard penetration test (SPT) soil borings to planned depths of 50 ft below existing grade at locations selected by CGC, in consultation with the project team, and located in the field by CGC. Note that Borings 2 and 8 could not be drilled to intended depths due to the presence of shallow concrete or boulders at intermediate depth, with the borings attempted at six and five locations, respectively, before being abandoned generally within 1 to 5 ft of the ground surface. The other six borings terminated at 42 ft to 48.9 ft below existing site grades due to auger and split-spoon refusal within very dense silty sand glacial till with scattered cobbles/boulders. The borings were drilled by Badger State Drilling (under subcontract to CGC) between November 21 and 23, 2016 using truck-mounted D-120 and CME-55 rotary drill rigs equipped with hollow stem augers and automatic SPT hammers. The specific procedures used for drilling and sampling are described in Appendix A. The boring locations are shown on the attached Soil Boring Location Exhibit in Appendix B. Ground surface elevations at the boring locations were estimated using topographic information from Dane County DCiMap, and the elevations should therefore be considered approximate (± 1 ft).

The subsurface profiles in the borings were fairly similar, and a generalized profile included the following strata, in descending order:

- 5.5 to 13.5 ft of ***variable fill*** consisting of *gravel* or 4 to 4.5 in. *asphalt* at the surface, underlain by very loose to very dense mixture of sand, gravel, cinders, foundry sand, and concrete, with lesser amounts of peat, cobbles/boulders, ash, glass and rope/twine; note that the lower part of the fill in Boring 1 consisted of medium stiff to stiff *clay* intermixed with peat and organics; as mentioned above, auger refusal on apparent concrete occurred 1 to 5 ft below existing grade in several locations around Borings 2 and 8, and a 2.5-ft thick layer of weathered to hard concrete (that could be augered) was encountered in Boring 5, followed by

- 1 to 2.5 ft of very loose to loose ***sedimentary to fibrous peat*** in Borings 3, 5, 6, and 7, over

- 6 to 19 ft of very soft to stiff ***lean clay***, predominantly with trace sand and organics, as well as scattered silt and thin fine sand seams in some locations; this layer was considered possible fill in Boring 1, underlain by

- Medium dense to very dense ***sand*** with significant amounts of silt and gravel and trace amounts of clay, as well as scattered silt seams, sand seams with lower silt content and cobbles/boulders to auger or split-spoon refusal at 42 to 48.9 ft below existing grade.

Water contents of the fill and natural lean clay soils ranged from 21.1 % to 50.3 % (generally in the 25 to 30% range). Water contents in the peat layer ranged from 121 to 187%, with organic content (by loss-on-ignition) ranging from 30% to 47%. Based on the water contents, pocket penetrometer readings (an estimate of the unconfined compressive strength of cohesive soil), as well as SPT N-values, the soft to stiff lean clay is considered to be slightly to moderately compressible, and fill and peat are considered to be moderately to highly compressible. These characteristics and their impact on foundation options will be discussed further in the foundation and floor slab design section of this report.

Note that a *possible chemical/petroleum odor* was noted in samples of fill and natural soils in Borings 3, 5, 6 and 7 collected within the central to southwestern areas of the site, and cinders, ash, foundry sand, etc. were encountered in the upper portion of most borings. Nearby sites are known to contain environmental contamination, so we recommend that an environmental consultant be retained (if not already involved) to address environmental questions, including off-site removal/disposal of excavation spoils (materials management plan), pumping of groundwater and subfloor venting.

Groundwater was encountered in the borings near 8.5 to 13.5 ft below existing site grades during or upon the completion of drilling, corresponding to approximately EL 837.5 ft to EL 843.5 ft. However, the water level in this part of Madison typically falls between EL 850 ft (Lake Mendota water level) and EL 845 ft (Lake Monona water level), and the slightly deeper water levels in the borings may be the result of pumping of a nearby high capacity municipal well. Also, the water level readings are only short-term readings, and due to the low permeability clay soils, the short-term readings may not represent long-term conditions where groundwater would likely fall between EL 845 and 850 ft. Fluctuations in the groundwater table should be expected in response to seasonal variations in precipitation, infiltration, the level of nearby Lakes Monona and Mendota, pumping of nearby wells and other factors. Detailed descriptions of the soil and groundwater conditions observed in the borings are included in Appendix B, along with two particle size distribution test reports.

DISCUSSION AND RECOMMENDATIONS

As discussed above, the soils encountered in the upper approximately 5.5 ft to 13.5 ft of the borings consisted of variable fill soils, which are underlain by compressible peat, low to moderate strength lean clay to depths of about 13 to 32.5 ft below current site grades, which are in turn underlain by more competent medium dense to very dense silty sands. Therefore, based on the subsurface conditions and fairly high foundation loads, it is our opinion that a deep foundation system, such as driven piles, that terminates within the very dense silty sands will be required to support the proposed structure. Alternatively, a high strength/stiffness intermediate foundation system such as GeoConcrete Columns™ (GCC's) (or similar) could also be considered for foundation support.

Due to the widespread presence of apparent non-engineered fill that is considered unacceptable for direct floor slab support due to the potential for long-term settlement, a structural floor slab supported on piles or a conventional floor slab supported with conventional ground improvement (e.g., Rammed Aggregate

Piers™ – RAPs) (or similar) is also recommended. Conventional floor slab support with surface stabilization of existing soils could also be considered, but this alternative requires that the owner understand and be willing to accept the risk that floor slab settlement or cracking may occur.

Our recommendations for site preparation, foundation, floor slab, tunnel and pavement design and construction are presented in the following paragraphs. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

1. Site Preparation

To prepare the site for construction, we recommend that the existing topsoil (where present) be removed to a minimum of 5 ft beyond the proposed construction areas. Topsoil is not suitable for re-use as backfill except in landscaped areas. The existing asphalt/concrete pavement should also be removed. Remnants of former structures should be entirely removed within the proposed building area, including the foundations, walls, slabs and utilities. Foundations and walls can potentially remain in place within pavement areas provided the structural elements are broken off at least 2 ft below the bottom of the planned pavement section and do not interfere with new utility construction. *Note that it appears that buried concrete is present across the site, especially in the eastern part of the site (near Borings 2, 5 and 8) where some of the borings could not penetrate the concrete. We recommend that a series of shallow test pits be conducted to further explore the extent of concrete across the site. Pre-excavation of pile caps and grade beams will likely be required prior to pile installation to prevent conflicts with buried concrete.* The base of the excavation in demolition and pavement removal areas should be checked for adequate soil conditions prior to backfilling with engineered granular backfill.

The exposed subgrade is expected to consist of variable fill involving sand, silt and clay, as well as roots/organics, cinders, foundry sand, glass, ash/burned debris, etc. The existing fill soils are considered unsuitable for foundation support and direct conventional slab support due to the potential risk of long-term settlement and cracking. Partial or full undercutting of the fill below floor slabs or floor slab support with rammed aggregate piers or a structural slab will likely be required, as discussed below in Section 2D. If the existing fill soils will remain in-place, the exposed soils in areas at-grade or requiring fill (if any) should be recompacted with a large vibratory compactor and then proof-rolled with a loaded tri-axle dump truck to check for soft/yielding areas. If soft/yielding areas are encountered, these areas should be undercut and replaced with granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557). Alternatively, well-graded 3-in. dense graded base (DBG) can be used to restore grades in undercut areas.

Due to the presence of soils at the site that appear to be impacted with petroleum or other chemical contaminants, as well as contain cinders, foundry sand, etc., we recommend that excavated soils either be kept on site and capped (if feasible and appropriate) or screened for environmental contaminants before being hauled off site. Contaminated soils should be properly disposed of in a licensed landfill. We recommend that an environmental consultant provide guidance on the need for special handling and disposal of impacted soils.

Fill placement (where required) to establish grades can then proceed. We recommend using granular soils (i.e., sands/gravels) as structural fill within the building envelope and upper few feet of pavement areas because these soils are relatively easy to place and compact in most weather conditions. Clay/silt soils are not recommended as structural fill because moisture conditioning will be required to achieve desired compaction levels, which could delay construction progress. Clay/silt soils are best used as fill in landscaped areas or in lower lifts of pavement areas provided the soils are dried back to facilitate compaction. We recommend that fill/backfill be compacted to at least 95% compaction (ASTM D1557) in accordance with our Recommended Compacted Fill Specifications presented in Appendix D. Periodic field density tests should be taken by CGC staff within the fill/backfill to document the adequacy of the compactive effort.

2. Foundation and Floor Slab Recommendations

In our opinion, foundation support for the proposed structure is complicated by fairly thick low- to moderate-strength and moderately to highly compressible soils, as well as high foundation loads. In view of this, we do not anticipate conventional spread footing foundations to be a feasible option, since significant undercutting depths (likely extending below the water table) and fairly low soil bearing pressures will likely prove this alternative impractical/uneconomical compared to other alternatives. Therefore, we recommend an intermediate or deep foundation system be used to support the planned building. In our opinion, to minimize unacceptable long-term performance of floor slabs, Rammed Aggregate Piers™ – RAPs (or similar) can be utilized to improve floor slab subgrades to support a conventional slab-on-grade, or a structural slab supported on deep foundations can be used. A conventional slab-on-grade without ground improvement support will likely require at least partial undercutting/stabilization of the surficial fill soils and involves a higher level of risk of unacceptable slab performance (settlement, cracking, etc.). Our foundation and floor slab design/construction recommendations are contained in the following subsections.

A. Driven Pile

To bypass the fill, peat and native clay soils, it is our opinion that a deep foundation system would provide suitable structural support for the least amount of risk. The deep foundation system should consist of driven steel piles that terminate in the very dense silty sand. Driven steel piles would include the following options:

- Steel oil field pipe, as described in the WisDOT *Standard Specifications for Highway and Structure Construction*, Section 550. A common oil field pipe pile size is 9-5/8-in. diameter with 0.395-in. wall thickness, and we recommend that the pile thickness potentially be increased to account for potential corrosion from the shallow soils that may be too deep or too costly to dispose of off-site to reasonably excavate below pile caps. We recommend that oil field pipes be driven closed-end and be concrete filled.

- Cast-in-place (CIP) concrete piling with steel shells (e.g., size 10-3/4-in. or 12-3/4-in.), as described in Section 550 of the *Standard Specifications*. Thicker pile shells (minimum 0.5 in. wall thickness) are recommended to better handle the high driving stresses expected to occur when driving into the very dense silty sands with significant gravel content and scattered cobbles/boulders, as well as the potentially corrosive nature of the shallow soils.

- Steel HP piling, also described in Section 550 of the *Standard Specifications* such as HP10x42 or HP12x53 pile sections. We recommend that HP piles be oversized to account for potential steel loss due to corrosion.

Piles should be driven to capacity or refusal within the very dense silty sands with estimated depths ranging from about 25 to 45 ft (generally about 30 to 40 ft) below existing grades. Note that non-displacement (HP) piles often drive to greater depths than displacement (pipe) piles due to the smaller end area, resulting in estimated pile lengths between about 35 and 55 ft below current site grades, in general. Because of the varying density and depths of the very dense sand (including slightly less dense zones), as well as scattered cobbles/boulders, some variation in pile lengths should be expected across the site. Based on recent project experience within the East Washington corridor, as well as several other recent pile projects in Madison, thicker-walled 9-5/8-in. diameter oil field pipe pile have generally performed very well in similar soil conditions developing fairly high capacities (using dynamic (Pile Driving Analyzer - PDA) testing) and having relatively low breakage rates.

End bearing and side resistance parameters for the design of pile foundations are included in Table 1. Typical allowable capacities (assuming a safety factor of 3) for 9-5/8-in. diameter steel oil field piles driven to refusal in the very dense silty sands are expected to be in the 70 to 80-ton range. HP 10x42 piles driven to refusal are expected to have capacities around 50 to 60 tons. "Refusal" generally means terminating driving when 10 to 20 blows (or more) are required to advance the pile 1 in. or less. At a minimum, actual pile capacities should be determined using conventional pile driving equations. The most widely used formulas for this purpose are the modified Engineering New formula or modified Gates formula as cited by the Wisconsin Department of Transportation *Standard Specifications*.

Note that the factor of safety can be reduced to 2.5 (and, as a result, the design load increased) for each pile if a Pile Dynamic Analysis (PDA) is used to confirm pile capacities during driving. PDA testing has resulted in significant economy in pile design on nearby projects along the East Washington corridor due to achieving significantly higher allowable pile capacities than determined using only static pile analysis methods. At least five dynamic test piles should be spread across the site to capture variation in the subsurface conditions, including the eastern part of the site where Borings 2 and 8 stopped on shallow obstructions. The factor of safety can be reduced to 2.0 if at least one static load test is performed to measure the actual load-deflection behavior of driven test piles, with the test pile and some additional production piles also monitored with PDA to develop the driving criteria.

TABLE 1 - Soil Parameters for Analysis of Driven Piles
Capital East Parking Ramp
E. Main Street & S. Livingston Street
Madison, WI

Soil Layer		Generalized Profile (1)					
		Miscellaneous Fill and Organic Soil	Very Loose to Loose Peat	Very Soft to Medium Stiff Silty and Lean Clay	Stiff Lean Clay	Medium Dense to Dense Sand, Some Silt	Dense to Very Dense Silty Sand
Approximate Depth Below Existing Grade (ft)	Boring 1	0 to 13.5	N.E.	13.5 to 18	18 to 32.5	32.5 to 39	>39
	Boring 3	0 to 5.5	5.5 to 7.5	7.5 to 13.5	13.5 to 23.5	23.5 to 29	>29
	Boring 4	0 to 6	N.E.	6 to 14	N.E.	14 to 23.5	>23.5
	Boring 5	0 to 6	6 to 8.5	8.5 to 12.5	12.5 to 16.5	16.5 to 22.5	>23.5
	Boring 6	0 to 6	6 to 7	7 to 13.5	N.E.	13.5 to 34	>34
	Boring 7	0 to 6	6 to 7	7 to 13.5	13.5 to 18.5	18.5 to 23.5	>23.5
	Boring 8	0 to 8.5	N.E.	N.E.	8.5 to 14.5	Inconclusive	
Estimated Soil Parameters (2)							
Angle of internal friction, ϕ (degrees)		24	0	0	0	32	38
Cohesion (psf)		0	0	500	1000	0	0
Moist unit weight (pcf)		110	110	110	115	125	130
Saturated unit weight (pcf)		120	120	120	125	130	135
Buoyant unit weight (pcf)		58	58	58	63	68	68
Earth pressure coefficients (2)							
Active, K_a		0.42	1.00	1.00	1.00	0.31	0.24
Passive, K_p		2.4	1.0	1.0	1.0	3.3	4.2
Sand Strata							
Constant of subgrade reaction, n_h (lb/cu in.) (2, 3)		5	-	-	-	40	125
Clay Strata							
Subgrade modulus of reaction, k_h (lb/cu in.) (constant with depth) (2)		-	-	100 (static)	300 (static) 100 (cyclic)	-	-
Additional *L-Pile* Parameters							
Soil type - description		Sand	Soft Clay	Soft Clay	Stiff Clay with Free Water	Sand	Sand
Driven Pile Parameters (5)							
Average Allowable Side Friction (ksf) (7)		N.R.	N.R.	0.15	0.25	0.2	1.3
Average Allowable End Bearing (ksf)		N.R.	N.R.	N.R.	N.R.	N.R. (6)	225

Notes:

(1) Depths have been generalized to some extent. Refer to boring logs for detailed descriptions at each location.
(2) Values do not include a factor of safety (i.e., FS = 1.0)
(3) Where $k_h = (n_h)(x)$ and x is the depth below ground surface.
(4) N.R. = not recommended
(5) Driven pile parameters include a safety factor of 3.0.
(6) End bearing in this intermediate sand layer will vary widely. We expect piles driven to refusal will extend to deeper, denser layer.
(7) Side friction for uplift should be reduced by 25%.

The minimum wall thickness and concrete strength for concrete-filled pipe piles should be determined by the structural engineer based on the design load established for the pile diameter selected. WisDOT generally recommends a minimum concrete strength of 3,500 psi.

We also recommend that possibly corrosive fill soils (containing cinders, foundry sand, etc.) be excavated/replaced around and beneath pile caps and grade beams to reduce the corrosion potential, assuming disposal costs are not excessive. The potentially corrosive fill material generally extends about 6 ft below grade, so much of the material will be removed during pile cap or grade beam excavations, but the excavations should be extended deeper (potentially near Boring 1) to remove the potentially corrosive fill below pile cap/grade beam grade. The areas around the piles should be backfilled with compacted granular backfill. *Note that pre-excavation of pile caps may be required due to the fairly widespread presence of buried concrete (or other obstructions) noted in some of the borings.*

The steel section of the piles should also be increased to account for potential corrosion that may occur due to shallow organic and waste materials that remain in-place, or the upper approximately 15 ft of the pile (measured from bottom of pile cap/grade beam) could be coated with a corrosion-resistant covering to protect the steel shells from corrosion.

It is recommended that the minimum spacing between piles be no less than 2.5 times the pile diameter. During driving, heaving and/or lateral displacements of driven piles may occur when nearby piles are subsequently driven. Therefore, it is important that frequent horizontal and vertical alignment checks be performed during the pile driving operation. Piles that heave more than 0.25 in. vertically should be reseated.

During construction, pile driving operations should be monitored by a CGC representative to document the following:

- That each pile was driven to the proper depth;
- That the driving criteria were satisfied at termination; and
- That collapsed or sweeping piles are replaced as appropriate.

Provided that pile foundations are designed and constructed in accordance with the recommendations presented above, we estimate that total and differential settlements will be below the typically tolerable levels of 1 in. and 0.5 in., respectively. For adequate frost protection, we recommend that pile caps and grade beams be founded at least 4 ft below finished grade.

Pile driving generates fairly strong vibrations, which could potentially affect surrounding buildings supported on shallow foundations bearing in/above the organic and soft soils, especially masonry structures. Therefore, we recommend that an existing conditions survey of the surrounding buildings be completed prior to commencing pile driving. ATC has provided some specific guidelines about driving piles near the underground transmission lines, including exposing the pipe conduit (and 5 ft below the pipe) and supporting the pipes where required. ATC indicates that they can provide additional guidance

on driving piles near the buried pipes, as well as backfilling requirements after pile driving is completed. Additionally, vibration monitoring can be completed to determine if the vibrations may potentially be damaging or to document that vibrations from pile driving do not exceed tolerable levels.

B. Other Deep Foundation Systems

Note that other deep foundation systems such as **drilled piers** or **augered cast-in-place grout piles** could also be considered for foundation support, but in our opinion these systems have some potential limitations at this site. Specifically, drilled pier construction will generate considerable amounts of drilling spoils, which due to apparent soil contamination noted in several borings, will likely need to be disposed of in a licensed landfill, and disposal costs could be significant. Full-depth temporary casing (removed during concrete placement) and drilling with slurry or positive water head would also likely be required in order to prevent sidewall sloughing and maintain integrity of bottom soils.

Auger cast-in-place piles will likely need to extend into the very dense silty sand glacial till in order to develop capacities competitive with other systems, and installation may be difficult due to significant gravel content and scattered cobbles/boulders. So, although we would not totally exclude consideration of these deep foundation systems, the above limitations would need to be factored into the costs of these systems.

C. Ground Improvement Systems

In our opinion, a couple of proprietary ground improvement systems could also be considered for foundation and slab support. Although there are different proprietary ground improvement systems that could potentially be considered, we will discuss two systems designed by Ground Improvement Engineering™ (GIE) and installed by a licensed installer as examples of feasible systems. Due to the high foundation loads coupled with the soft and organic shallow soils, we anticipate that foundation support would require a rigid inclusion system such as GeoConcrete™ columns (GCC's) that has high strength and stiffness. The GCC system involves a hollow mandrel displacement system that is driven to the design depth followed by the construction of an enlarged concrete base (bulb) by way of raising and lowering the mandrel as concrete is pumped under pressure. Once the enlarged concrete base is created, the mandrel is extracted as concrete is pumped under pressure to construct a smaller-diameter concrete pier (column) to just below the bottom of footing grade. A thin compacted gravel pad would be constructed above the GCC's followed by conventional spread footings and column pads. (The gravel pad is necessary as a shear break since the GCC's would provide axial capacity but not lateral load resistance.) Preliminary estimated allowable capacities of GCC's are in the 100-ton range, with an estimated allowable bearing pressure for design of spread footings bearing above the GCC's around 12 ksf. GCC's would extend to the dense to very dense sand layer, with preliminary GCC installation depths of approximately 20 to 30 ft below existing, although the installation depth near Borings 1 and 3 may be on the order of 30 to 45 ft due to the deeper clays.

In our opinion, additional support and settlement control of a conventional floor slab system could be accomplished using Rammed Aggregate Piers™ (RAPs). (Note that RAPs are used as foundation support, but the high foundation loads and soft and organic soil conditions are not considered appropriate for a "conventional" RAP system for foundation support for this project.) Although this system is a proprietary system designed by GIE and installed by a licensed installer, other similar systems may be applicable alternatives. This system is not a deep (pile) foundation, but is considered an intermediate foundation system that instead essentially stiffens the variable fill, organic soils and marginal cohesive soils to a sufficient depth below slab grade such that a conventional slab system is feasible while limiting slab deflection to typically tolerable levels. For floor slab support, the RAPs would be spaced on a wider grid pattern (compared to typical foundation applications) within floor slab areas. A hollow mandrel system would be used to compact crushed stone/dense graded base to construct the aggregate piers, which should generate minimal spoils. The subgrade would then be prepared in a similar manner to a typical slab-on-grade (recompaction/proof-rolling, etc.) followed by conventional, reinforced concrete slab-on-grade.

Full-time inspection is recommended during GCC and RAP (or other system) installation to document their construction according to design requirements, and this cost is included in the installation cost by GIE. GIE will also conduct one or more load tests to check that the installed piers satisfy design assumptions. We recommend that load tests (or supplemental borings) be completed in the eastern part of the site (after shallow concrete removal) to further explore these areas of the site where borings could not be advanced to intended depths. *Note that pre-excavation of pier locations will likely be required due to the fairly widespread presence of buried concrete (or other obstructions) noted in some of the borings.* Subgrade preparation where RAPs are installed generally includes recompaction of the tops, recompaction or hand-trimming of the soils between the RAPs, aggregate pad above GCC's, as well as other site-specific guidelines determined by GIE. RAP systems have been successfully used for foundation and/or floor slab support on many projects in the Madison area, including nearby projects within the East Washington corridor with similar soil conditions.

Note that the RAP installation process does generate vibrations, but the vibrations from RAP installation are generally smaller and attenuate quicker than the stronger vibrations from pile driving. However, care is required if RAPs will be installed near existing structures (including ATC transmission lines), including the completion of a pre-condition survey of surrounding structures and possibly vibration monitoring to determine if vibrations may potentially damage nearby structures. Excavation below footing/slab grade immediately adjacent to RAPs also requires special consideration depending on the situation.

D. Floor Slab Support

The shallow soils on this site include granular and cohesive fill, which is intermixed with miscellaneous debris and is underlain by a thin peat layer and soft to stiff cohesive soils. In our opinion, the shallow fill and organic soils are considered unsuitable for direct slab support due to the likelihood that unacceptable total and differential settlement may occur over time. The floor slab support alternatives that could be considered include a structural floor slab supported on driven piles, a conventional floor slab supported

on rammed aggregate piers (RAPs) or a conventional floor slab with partial undercutting/stabilization of shallow unsuitable soils.

In our opinion, the first two alternatives (driven pile-supported structural slab or RAP-supported conventional slab) involve the least amount of risk of unacceptable floor slab performance (settlement, cracking, etc.), but the highest up-front costs, with the structural slab likely more expensive than the RAP alternative. The conventional floor slab alternative with partial undercutting/stabilization of shallow unsuitable soils likely involves the lowest up-front cost, but also carries the highest long-term risk of unacceptable floor slab performance, including slab settlement and/or cracking. *The risk is the owner's responsibility.* If the owner is willing to accept the risk that floor slab settlement and/or cracking may occur and a conventional floor slab will be constructed, the owner's risk of undesirable slab performance can be reduced (though not eliminated) by an additional stone stabilization layer (potentially on the order of 1 to 2 ft thick) below the slab, coupled with careful slab preparation practices. The practices would involve thoroughly recompacting the subgrades with a large vibratory compactor and then proof-rolling the subgrades with a loaded tri-axle dump truck to check for loose/soft zones. If loose or soft zones are encountered, these areas should be undercut, and grade re-established with granular soil compacted to a minimum of 95% compaction (ASTM D 1557) or well-compacted 3-in. DBG. *We expect widespread undercutting of about 1 to 2 ft will likely be required to develop a reasonably firm subgrade, with deeper undercutting potentially required when concentrated pockets of cinders, ash, foundry sand, etc. or organic soils are encountered.* The design subgrade modulus is based on a recompacted/stabilized subgrade such that non-yielding conditions are developed.

To serve as a capillary break, the final 4 to 6 in. of soil placed below the slab should consist of well-graded sand or gravel with no more than 5% by weight passing a No. 200 U.S. standard sieve. Note that some structural engineers require a 6-in. layer of DGB, such as 1.25-in. DGB, below the slab to increase the subgrade modulus immediately below the slab. Fill and base layer material below the floor slab should be placed as described in the "Site Preparation" section of this report. For a conventional slab bearing on a 4 to 6-in. thick sand/gravel layer above a firm or adequately stabilized subgrade, a subgrade modulus of 75 pci can be used for slab design. Floor slabs bearing on a minimum 6-in. thick layer of DGB above a firm or adequately stabilized base may be designed using a subgrade modulus of 100 pci. To further minimize the potential for moisture migration, a plastic vapor barrier can be also be utilized below the slabs. The slab should be structurally separate from the foundations and have construction joints and reinforcement for crack control.

For the RAP alternative, a minimum 5-in. thick conventional slab-on-grade (including capillary break as described in the previous section) with temperature/shrinkage reinforcement will likely be required. GIE can provide additional details on floor slab support. RAPs can be bid as an alternative to undercutting/stabilization (or a structural slab supported on deep foundations), with slab design included in the package.

Note that due to environmentally impacted soils at this site a sub-floor venting system may be required to remove harmful vapors that may accumulate below the slab. We recommend that an environmental

consultant evaluate the need for and design of a sub-floor venting system. On past projects if the venting system consists of compacted clear stone, the stone layer thickness can be included as part of the stabilization layer discussed above.

3. Seismic Design Category

In our opinion, the average soil properties in the upper 100 ft of the site (based on SPT blow counts "N-values" generally between 15 and 50 blows/ft on average) can be characterized as a stiff soil profile. This characterization would place the site in Class D for seismic design according to International Building Code (see Table 1613.5.2).

4. Tunnel Considerations

We understand that an access/maintenance tunnel is being considered above the three concrete-encased high voltage electrical transmission lines present along the western and southern parts of the site. The bottom of the tunnel is expected to be crushed gravel or stone and will match the grade of the concrete encasing the transmission lines. Based on provided "as-built" plan and profile sheets, the bottom of the conduit within the site is near 0 to -4 ft MCD (where 0 ft MCD equals 845.6 ft), which equals approximately 844.6 ft to 842.6 ft in USGS datum. As mentioned earlier in this report, short-term water level readings in the borings ranged from approximately EL 837.5 ft to EL 843.5 ft, and longer-term water levels should be expected to be in the range of EL 845 ft (approximate level of Lake Monona) to 850 ft (approximate level of Lake Mendota). For design purposes we recommend using a high groundwater level of EL 848 ft. Based on the proposed tunnel base grades, groundwater levels and soil conditions, we have the following recommendations:

- The soil conditions expected at the bottom of the tunnel will likely consist of variable fill, peat or soft to stiff clay. Assuming the gravel walkways will only experience foot traffic or light wheeled equipment, we recommend installing a minimum 1-ft thick compacted crushed clear stone layer underlain by a moderate to heavy-duty non-woven geotextile fabric (e.g., Mirafi 160N or heavier). The stone layer thickness may need to be increased if very loose/soft conditions exist or if the stone layer will need to support heavier loads. The geotextile fabric is recommended to reinforce and separate the stone from underlying marginal soils and also reduce the potential for soil migration due to fluctuations in the water table. The fabric should be overlapped at least 2 ft between adjacent sheets and be wrapped up the edges of the conduit duct package in the middle and pile caps/walls along the edges.

- Drain tile in the gravel layer and sumps at the low points should be located in the tunnel to lower the water table to facilitate maintenance operations. Buoyancy effects on the duct package from elevated groundwater should also be considered to determine if unbalanced hydrostatic pressures could damage the duct package. However, this should not be an issue if the adjacent gravel walkways are well-drained.

- Due to apparent contaminated soil in several of the borings, ventilation of the tunnel is recommended to remove fumes that could potentially be harmful to occupants. Other confined space precautions should also be considered, and we recommend that an environmental engineer be engaged to determine appropriate measures for tunnel design.

5. Pavement Design

Based on the provided site plan, we anticipate that marginal areas surrounding the projected building footprint will be paved with concrete. We recommend that the concrete pavement subject to vehicle loads should be at least 6-in. thick and contain mesh or fiber reinforcement for crack control. The pavement design assumes a stable/non-yielding subgrade which will be evaluated using proof-rolling techniques. Some undercutting/stabilization of loose or soft surficial fill soils may be required to develop a suitable subgrade similar to below floor slabs, and we recommend the budget include a contingency for subgrade undercutting/stabilization, possibly including as much as 1 to 2 ft of stone above a geotextile layer. Concrete slabs underlain by a minimum 6-in. thick DGB layer over a firm/stabilized sand, silt or clay subgrade can be designed utilizing a subgrade modulus of 75 pci. If there is a delay between subgrade preparation and DGB placement, the subgrade should be recompacted. Alternative pavement designs may prove acceptable and should be reviewed by CGC.

CONSTRUCTION CONSIDERATIONS

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

- During cold weather, exposed subgrades should be protected from freezing before and after pile cap/grade beam construction. Fill (if any) 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 in accordance with current OSHA standards.

- Based on observations made during the field exploration and considering seasonal influences, groundwater infiltration into pile cap/grade beam excavations may occur, especially in deeper shear wall pads, elevators or stairwells. For groundwater drawdowns of less than about 1 to 2 ft, groundwater can likely be controlled using submersible pumps in filtered sump pits. Groundwater drawdowns of more than about 1 to 2 ft will likely require well points or deep wells to adequately control groundwater. Additional water accumulating at the base of excavations as a result of precipitation or seepage (if any) should be controlled and quickly removed using pumps operating from filtered sump pits. Dewatering means and methods are the responsibility of the contractor.

RECOMMENDED CONSTRUCTION MONITORING

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

- Pile cap/grade beam excavation and subgrade preparation;
- Foundation installation and construction;
- Backfill placement and compaction; and
- Concrete placement.

****

CLOSING REMARKS

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.

David A. Staab, P.E., LEED AP
Consulting Professional

William W. Wuellner, P.E.
Senior Geotechnical Engineer

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring Location Exhibit
Logs of Test Borings (8)
Particle Size Distribution Test Reports (2)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications
Appendix D - Recommended Compacted Fill Specifications

cc: Mr. Dan Windorski, GRAEF (email)

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

The subsurface exploration involved drilling eight standard penetration test (SPT) soil borings to planned depths of 50 ft below existing grade at locations selected by CGC, in consultation with the project team, and located in the field by CGC. Note that Borings 2 and 8 could not be drilled to intended depths due to the presence of shallow concrete or boulders at intermediate depth, with the borings attempted at six and five locations, respectively, before being abandoned. The other six borings terminated at 42 ft to 48.9 ft below existing site grades due to auger and split-spoon refusal within very dense silty sand glacial till with scattered cobbles/boulders. The borings were drilled by Badger State Drilling (under subcontract to CGC) between November 21 and 23, 2016 using truck-mounted D-120 and CME-55 rotary drill rigs equipped with hollow stem augers and automatic SPT hammers. The boring locations are shown on the attached Soil Boring Location Exhibit in Appendix B. Ground surface elevations at the boring locations were estimated using topographic information from Dane County DCiMap, and the elevations should therefore be considered approximate (± 1 ft).

In each boring, soil samples were obtained at 2.5-foot intervals to a depth of 10 feet and at 5 foot 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.

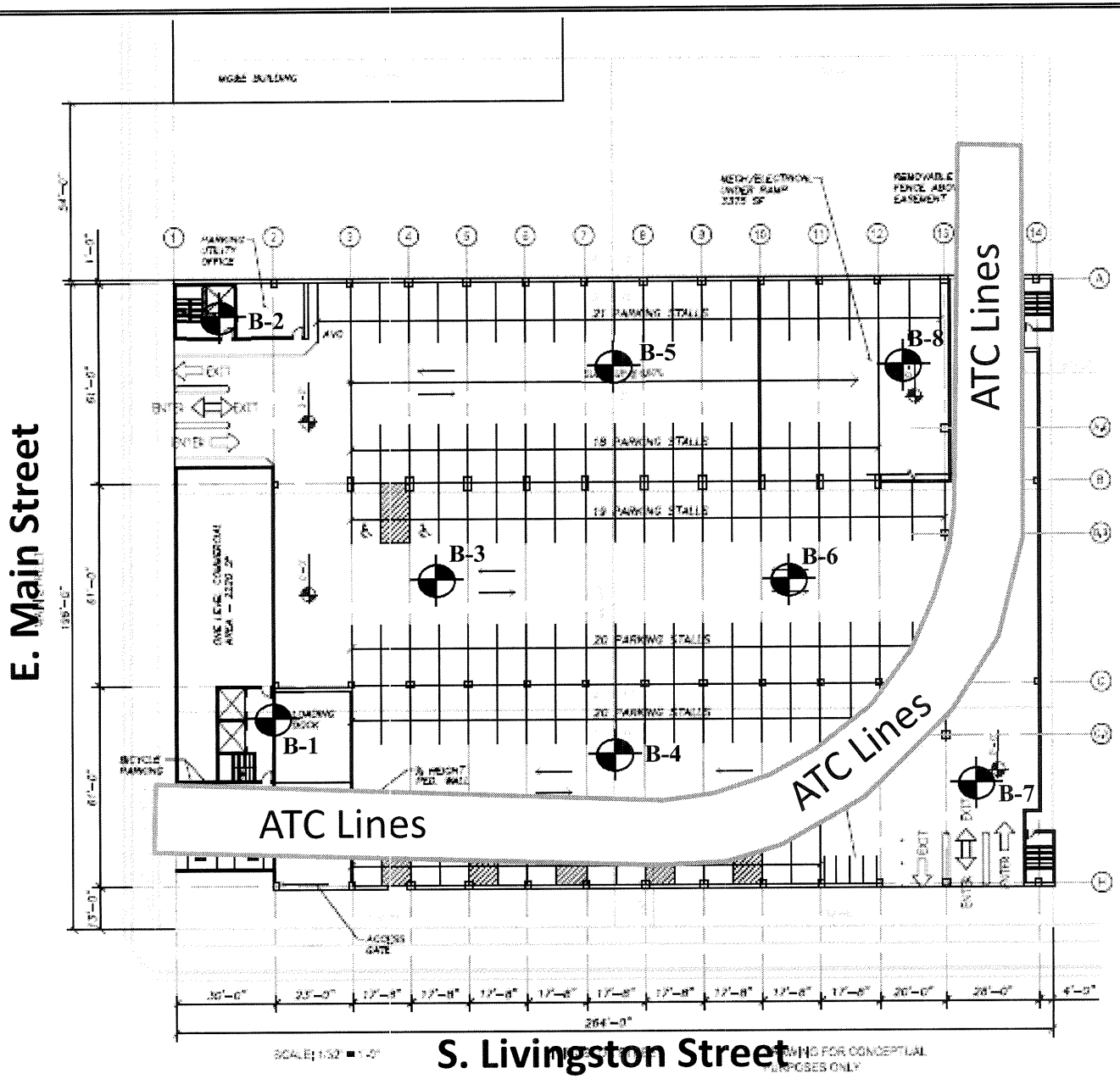
2. Standard Penetration Test and Split-Barrel Sampling of Soils
   (ASTM Designation: D 1586)

   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 samples for possible environmental contaminants was not conducted by the drillers, as environmental site assessment activities were not part of CGC's work scope.* Whenever possible, water level observations were made in the borings during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the boreholes were backfilled with bentonite in accordance with WDNR regulations, and the soil samples were delivered to our laboratory for visual classification and laboratory testing. The soils were visually classified by a geotechnical engineer using the Unified Soil Classification System. The final logs prepared by the engineer, and a description of the Unified Soil Classification System are presented in Appendix B.

APPENDIX B

SOIL BORING LOCATION EXHIBIT
LOGS OF TEST BORINGS (8)
PARTICLE SIZE DISTRIBUTION REPORTS (2)
LOG OF TEST BORING – GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM



Legend

Denotes Boring Location and Number

Notes

1. Borings drilled by Badger State Drilling between November 21 and 23, 2016.
2. Base map from City of Madison.
3. Boring locations are approximate.

Job No. C16051-25	**CGC, Inc.**	**SOIL BORING LOCATION EXHIBIT** **Proposed Capital East Parking Ramp** **E. Main Street & S. Livingston Street** **Madison, WI**
Date: 12/2016		

LOG OF TEST BORING

CGC Inc.

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 1
Surface Elevation (ft) 851±
Job No. C16051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	W	LL	PL	LI
						4 in. Asphalt / 8 in. Base Course					
1		10	M	4		FILL: Very Loose to Loose, Black Mixture of Sand, Cinders and Foundry Sand, Trace Gravel					
2		8	M	4	5		(0.5-0.75)				
3		8	W	2		FILL: Medium Stiff, Greeenish Gray Lean Clay, Trace to Little Sand and Gravel, Trace Organics	(0.25)	50.3			5.9
4		6	W	7	10	FILL: Very Soft to Soft, Light Gray/Dark Gray Lean Clay, Intermixed with Peat Seams/Pockets, Scattered Glass, Cinders, Twine, etc.	(0.25)	39.3			
5		18	W	5	15	Soft to Medium Stiff, Light Greenish Gray Silty CLAY, Scattered Silt and Fine Sand Seams (CL-ML - Possible Fill)	(0.5)	21.9			
6		18	W	9	20	Stiff, Brown Lean CLAY, Trace Sand, Scattered Silt Seams (CL - Possible Fill)	(1.0-1.25)				
7		1	W	14	25	Note: Rope/Twine Encountered in Samples From 23.5 to 25 ft, Which May Have Been From Upper Layer, As Soil Appears to be Natural Above and Below.	(-)				
8		18	W	14	30		(1.25)	27.9			
9		4	W	11	35	Medium Dense to Very Dense, Gray Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) Hard Drilling Near 33 ft					
10		4	W	50/5"	40						
					45	End Boring/Auger Refusal at 42 ft					
					50	Borehole Backfilled with Bentonite Slurry, Chips and Asphalt Patch					
					55						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 9.0' Upon Completion of Drilling
Time After Drilling
Depth to Water ▼
Depth to Cave in

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

GENERAL NOTES

Start 11/21/16 End 11/21/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic Hammer

CGC Inc.

LOG OF TEST BORING

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 2
Surface Elevation (ft) 851±
Job No. C16051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	W	LL	PL	LI
1	■	10	M	4		4 in. Asphalt / 7 in. Base Course					
						FILL: Very Loose to Loose, Black Mixture of Sand, Cinders and Foundry Sand, Trace Gravel					
2	■	1	M	50/2"	5	Weathered to Hard Concrete					
						End Boring/Auger Refusal at 5 ft					
						Borehole Backfilled with Soil Cuttings					

10 15 20 25 30 35 40 45 50 55

WATER LEVEL OBSERVATIONS

While Drilling ▽ NW Upon Completion of Drilling
Time After Drilling
Depth to Water ▼
Depth to Cave in

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

GENERAL NOTES

Start 11/22/16 End 11/22/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic Hammer

CGC Inc.

LOG OF TEST BORING

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 2A
Surface Elevation (ft) 851±
Job No. C16051-25
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	LI
					5	2A - Offset 10 ft Southeast, Auger Refusal at 1 ft 2B - Offset 16 ft South, Auger Refusal at 1 ft 2C - Offset 15 ft East, Auger Refusal at 1 ft 2D - Offset 18 ft West, Auger Refusal at 4 ft 2E - Offset 30 ft Southwest, Auger Refusal at 2 ft					
					10						
					15						
					20						
					25						
					30						
					35						
					40						
					45						
					50						
					55						

WATER LEVEL OBSERVATIONS

While Drilling ▽ NW Upon Completion of Drilling
Time After Drilling
Depth to Water ▼
Depth to Cave in

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

GENERAL NOTES

Start 11/21/16 End 11/21/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic Hammer

CGC Inc.

LOG OF TEST BORING

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 3
Surface Elevation (ft) 851±
Job No. C16051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
1		4	M	50/5"		FILL: Very Dense, Brown/Gray Gravelly Fine to Coarse Sand, Some Silt, Intermixed with Concrete					
2		12	M	9	5	FILL: Loose, Gray Silty Fine to Coarse Sand, Intermixed with Gravel and Concrete, Scattered Cinders, Organics and Cardboard (Note: Possible Chemical Odor)	(0.25)	120.5			29.7
3		16	M/W	2				37.8			
4		18	W	4	10	Very Loose, Black Sedimentary to Fibrous PEAT (PT) (Note: Possible Chemical Odor)	(0.25)	21.1			
5		16	M/W	8	15	Very Soft to Soft, Greenish Gray Lean CLAY, Trace Sand and Organics (CL) (Note: Possible Chemical Odor In Upper Part of Layer) Increasing Sand Content with Depth	(1.75)				
6		16	W	8	20	Stiff, Brown Lean CLAY, Trace Sand, Scattered Silt Seams (CL) Trace Plant Fibers Near 20 ft	(1.5)	25.1			
7		10	W	13	25	Medium Dense to Very Dense, Gray Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)					
8		12	W	59	30	P200 (Sample 8): 25.1%		10.0			
9		10	W	50/5"	35	Grades to Gray-Brown Near 35 ft					
10		4	W	50/5"	40						
11		5	W	50/5"	45						
						End Boring/Auger Refusal at 46 ft					
					50	Borehole Backfilled with Bentonite Slurry and Chips					
					55						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5' Upon Completion of Drilling
Time After Drilling
Depth to Water ▼
Depth to Cave in

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

GENERAL NOTES

Start 11/21/16 End 11/21/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic Hammer

CGC Inc.

LOG OF TEST BORING

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 4
Surface Elevation (ft) 851±
Job No. C16051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	W	LL	PL	LI
						8 in. ± Gravel FILL					
1		2	M	6		FILL: Loose, Dark Brown-Gray Peat, Sand, Concrete, Cinders, etc.					
2		6	M	2	5						
3		18	M	4		FILL: Very Loose, Brown/Dark Gray Silty Fine Sand and Sandy Lean Clay, Intermixed with Peat, Glass, Cinders, etc.	(0.5-0.75)	27.2			
4		18	W	5	10	Medium Stiff, Greenish Gray/Brown (Mottled) Lean CLAY, Trace Sand and Organics (CL)	(0.75)				
5		18	W	49	15	Medium Dense to Dense, Gray Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders, Scattered Sand Seams with Trace to Little Silt (SM)	(1.0)				
6		10	W	19	20						
7		14	W	80	25	Very Dense, Olive Brown Fine to Medium SAND, Some Silt, Little to Some Gravel, Scattered Cobbles/Boulders (SM)					
8		8	W	50/5"	30	Grades to Gray-Brown with Depth					
9		10	W	50/5"	35						
10		10	W	50/5"	40	P200 (Samples 10 + 11): 33.2%		9.4			
11		10	W	50/4"	45						
12		4	W	50/5"	50	End Boring/Split-Spoon Refusal at 48.9 ft					
					55	Borehole Backfilled with Bentonite Slurry and Chips					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5' Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

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

GENERAL NOTES

Start 11/22/16 End 11/22/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic
Hammer

CGC Inc.

LOG OF TEST BORING

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 5
Surface Elevation (ft) 851±
Job No. C16051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	qu (qa) (tsf)	W	LL	PL	LI
						4.5 in. Asphalt / 9 in. Base Course					
1		0	M	50/1"		Weathered to Hard Concrete					
2		12	M	7	5	FILL: Loose, Black Mixture of Sand, Cinders and Foundry Sand, Trace Gravel					
3		14	M	3		Very Loose, Black Fibrous PEAT, Trace Sand (PT)		187.0			47
4		18	M/W	3	10	Medium Stiff to Stiff, Light Brown/Gray (Mottled) Lean CLAY, Trace Sand (CL)	(0.5-0.75)	24.2			
5		13	W	18	15		(1.5-1.75)				
						Increasing Sand and Gravel Near 15 ft					
6		14	W	45	20	Dense, Gray Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM) (Note: Possible Faint Chemical Odor Near 20 ft)					
7		7	W	50/4"	25	Very Dense, Brown/Gray Fine to Medium SAND, Some Silt, Little to Some Gravel, Scattered Cobbles/Boulders (SM)					
8		8	W	50/5"	30						
9		13	W	31	35	Dense Near 35 ft					
10		2	W	50/4"	40	Gravelly Zone Near 40 ft					
11		6	W	50/5"	45						
12		3	W	50/4"	50	End Boring/Split-Spoon Refusal at 48.8 ft					
						Borehole Backfilled with Bentonite Slurry, Chips, and Asphalt Patch					
					55						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 10.0' Upon Completion of Drilling
Time After Drilling
Depth to Water ▼
Depth to Cave in

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

GENERAL NOTES

Start 11/21/16 End 11/21/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic Hammer

CGC Inc.

LOG OF TEST BORING

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 6
Surface Elevation (ft) 851±
Job No. C16051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	W	LL	PL	LI
						4 in. Asphalt / 10 in. Base Course					
1		12	M	12		FILL: Medium Dense, Black Mixture of Sand, Cinders, Ash and Foundry Sand, Trace Gravel					
2		14	M/W	14	5	(Note: Apparent Chemical Odor Near 5 ft)					
3		14	M	4		Very Loose to Loose, Black Sedimentary to Fibrous PEAT (PT)	(0.75)				
4		18	W	5	10	(Note: Possible Chemical Odor)	(0.25-0.75)				
						Soft to Medium Stiff, Gray Lean CLAY, Trace Sand (CL)					
5		9	W	18	15	(Note: Strong Chemical/Petroleum Odor)					
						Medium Dense to Dense, Gray Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)					
6		4	W	38	20	(Note: Possible Chemical Odor in Upper Part of Layer)					
						Scattered Silt Seams Near 20 ft					
7		11	W	82/10"	25	Very Dense, Gray Silty Fine SAND, Scattered Silt Seams, Trace Gravel, Scattered Cobbles/Boulders (SM)					
8		5	W	15	30	Medium Dense to Very Dense, Olive Brown Silty Fine to Medium SAND, Some Silt, Little to Some Gravel, Scattered Cobbles/Boulders (SM)					
9		12	W	54	35	Grades to Gray-Brown Near 35 ft					
10		4	W	50/5"	40	Scattered Sand Seams with Trace to Little Silt Near 40 ft					
11		4	W	50/4"	45						
12		2	W	50/5"	50	End Boring/Split-Spoon Refusal at 48.9 ft					
					55	Borehole Backfilled with Bentonite Slurry, Chips and Asphalt Patch					

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5' Upon Completion of Drilling
Time After Drilling
Depth to Water ▼
Depth to Cave in

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

GENERAL NOTES

Start 11/22/16 End 11/22/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic Hammer

CGC Inc.

LOG OF TEST BORING

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 7
Surface Elevation (ft) 852±
Job No. C16051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	W	LL	PL	LI
						4.5 in. Asphalt / 8.5 in. Base Course					
1		2	M	50/3"		FILL: Very Dense, Gray Fine to Coarse Sand, Some Gravel, Trace to Little Silt, Intermixed with Concrete					
2		6	M	9	5						
3		8	M	6		FILL: Loose, Black Mixture of Sand, Cinders and Foundry Sand, Trace Gravel	(0.5-0.75)	26.1			
4		18	W	5			(0.75-1.0)				
					10	Loose, Dark Brown/Dark Gray PEAT (PT - Based on Driller's Description)					
5		18	W	8		Medium Stiff, Greenish Gray Lean CLAY, Trace Sand and Organics (CL)	(1.0-2.0)				
					15	Color Grades to Gray Near 10 ft					
						(Note: Possible Faint Chemical Odor Near 10 ft)					
6		8	W	49		Stiff, Dark Gray/Gray-Brown (Laminated) Lean CLAY and SILT, Trace Sand (CL/ML)					
					20	(Note: Stained Dark Gray with Possible Chemical Odor)					
7		3	W	50/4"		Dense, Gray Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)					
					25	(Note: Apparent Faint Chemical Odor Near 20 ft)					
						Apparent Boulder Near 20.5 to 22.5 ft					
8		8	W	50/5"		Dense to Very Dense, Gray Fine to Medium SAND, Some Silt and Gravel, Scattered Cobbles/Boulders (SM)					
					30						
9		8	W	43		Grades to Brown-Gray Near 30 ft					
					35						
10		1	W	50/3"		Drove Stone (Minimal Recovery) Near 38.5 ft					
					40						
11		4	W	50/5"							
					45						
12		2	W	50/4"							
					50	End Boring/Split-Spoon Refusal at 48.8 ft					
						Borehole Backfilled with Bentonite Slurry, Chips and Asphalt Patch					
					55						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 8.5' Upon Completion of Drilling
Time After Drilling
Depth to Water ▼
Depth to Cave in

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

GENERAL NOTES

Start 11/22/16 End 11/22/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic Hammer

CGC Inc.

LOG OF TEST BORING

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 8
Surface Elevation (ft) 851±
Job No. C16051-25
Sheet 1 of 1

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

SAMPLE No.	TYPE	Rec (in.)	Moist	N	Depth (ft)	VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES qu (qa) (tsf)	W	LL	PL	LI
						10 in. +/- Sand/Gravel Fill					
1		10	M	14		FILL: Medium Dense, Light Brown Fine to Coarse Sand, Some Gravel, Trace Silt, Scattered Silt Seams/Pockets					
2		6	M	24	5	Intermixed with Concrete Near 5 ft					
						No Sample Taken at 6 to 7.5 ft due to Apparent Concrete Debris					
3		18	M	5	10	Stiff, Light Brown/Gray (Mottled) Lean CLAY, Trace Sand (CL)	(1.0-1.5)				
4		8	W	57/8"	15	Very Dense, Olive Brown Fine to Medium SAND, Some Silt, Little to Some Gravel, Scattered Cobbles/Boulders (SM) Apparent Boulder Near 15 ft	(1.0)				
					20	End Boring/Auger Refusal at 15 ft					
						Borehole Backfilled with Bentonite Slurry and Chips					
					25						
					30						
					35						
					40						
					45						
					50						
					55						

WATER LEVEL OBSERVATIONS

While Drilling ▽ 13.5' Upon Completion of Drilling _____
Time After Drilling _____
Depth to Water _____ ▼
Depth to Cave in _____

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

GENERAL NOTES

Start 11/21/16 End 11/21/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic Hammer

CGC Inc.

LOG OF TEST BORING

Project: Capital East Parking Ramp
E. Main Street and S. Livingston
Location: Madison, WI

Boring No. 8A
Surface Elevation (ft) 851±
Job No. C16051-25
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	LI
					5	8A - Offset 5 ft West, Auger Refusal at 2.5 ft 8B - Offset 5 ft North, Auger Refusal at 4 ft 8C - Offset 10 ft East , Auger Refusal at 3 ft 8D - Offset 15 ft North, Auger Refusal at 2 ft					
					10						
					15						
					20						
					25						
					30						
					35						
					40						
					45						
					50						
					55						

WATER LEVEL OBSERVATIONS

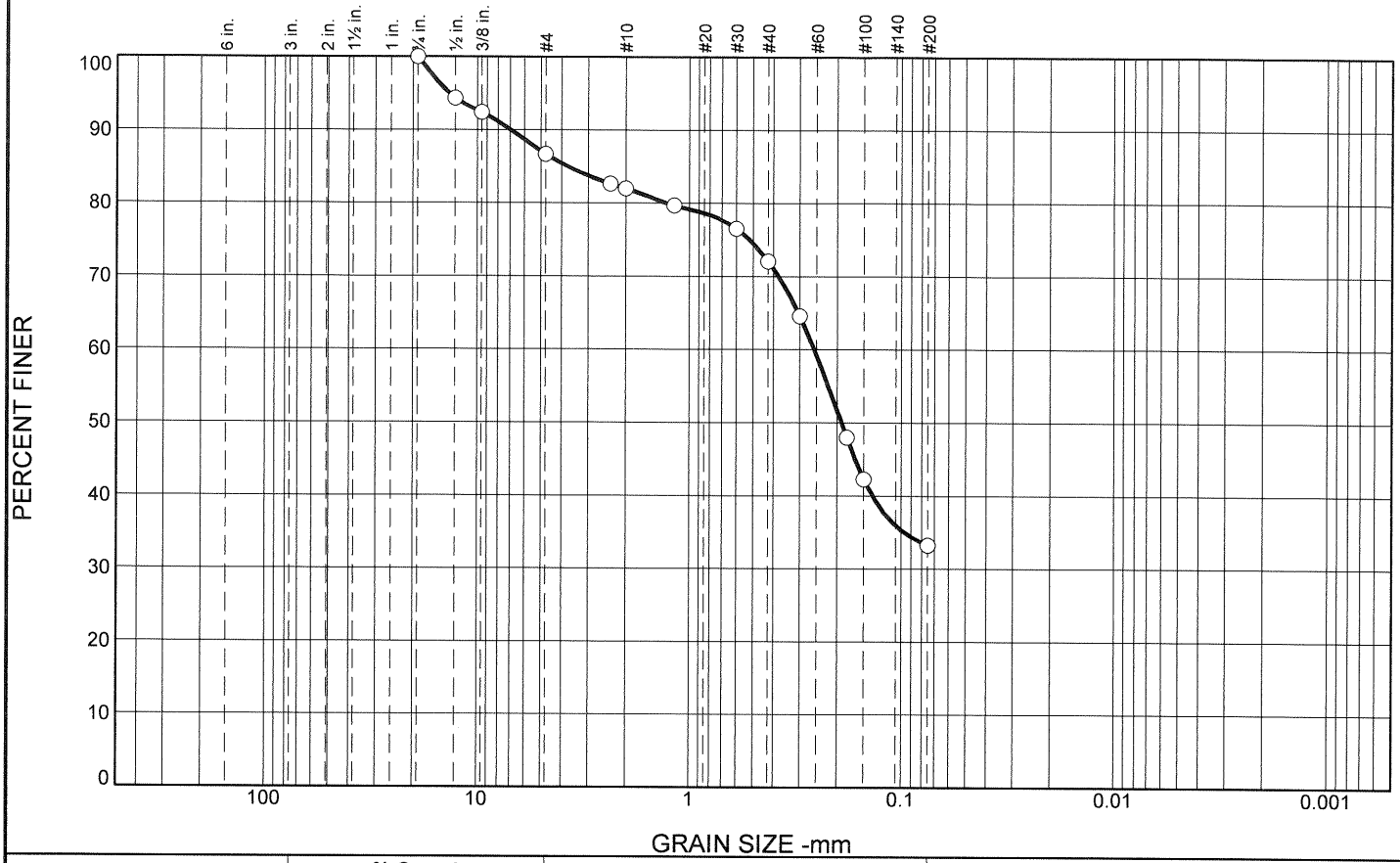
While Drilling ▽ NW Upon Completion of Drilling
Time After Drilling
Depth to Water ▼
Depth to Cave in

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

GENERAL NOTES

Start 11/21/16 End 11/21/16
Driller BSD Chief MC Rig CME-55
Logger FD Editor DAS
Drill Method 4.25" HSA; Automatic
Hammer

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	13.3	4.7	9.9	38.9	33.2	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3/4	100.0		
1/2	94.3		
3/8	92.4		
#4	86.7		
#8	82.7		
#10	82.0		
#16	79.7		
#30	76.5		
#40	72.1		
#50	64.6		
#80	48.0		
#100	42.3		
#200	33.2		

* (no specification provided)

Material Description

Brown Fine to Medium, Some Silt and Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 6.9787 D_{85}= 3.7537 D_{60}= 0.2572
D_{50}= 0.1911 D_{30}= D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Natural Moisture = 9.4%

Sample Number: B-4, S-10 + S-11

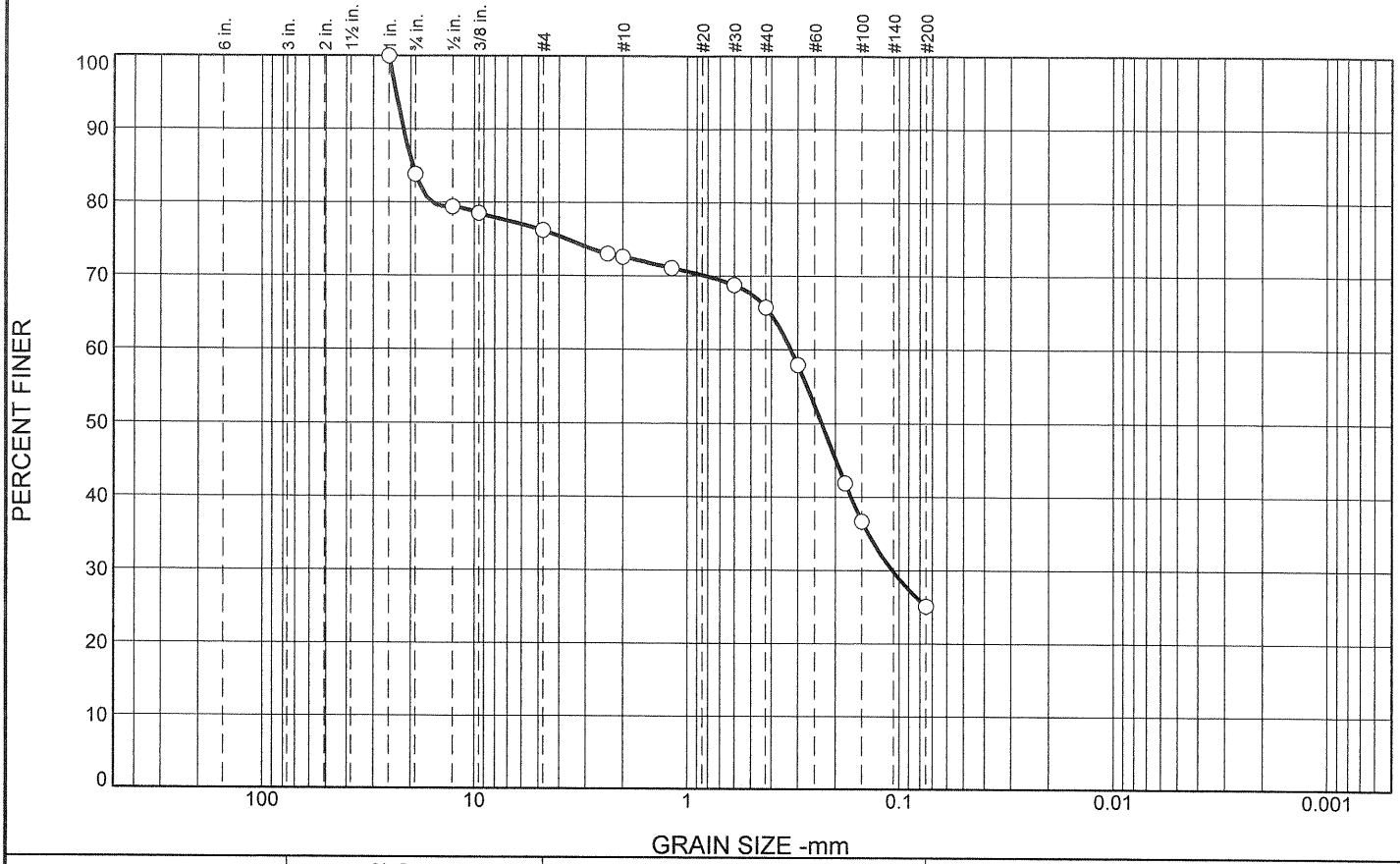
Date: 11/29/16

CGC, Inc.

Client: City of Madison
Project: Capital East Ramp
Project No: C16051-25 **Figure**

Tested By: DRW **Checked By:** DAS

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	16.2	7.6	3.6	6.9	40.6	25.1	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1	100.0		
3/4	83.8		
1/2	79.4		
3/8	78.5		
#4	76.2		
#8	73.0		
#10	72.6		
#16	71.1		
#30	68.8		
#40	65.7		
#50	57.9		
#80	41.9		
#100	36.7		
#200	25.1		

* (no specification provided)

Material Description

Brown Fine to Medium Sand, Some Silt and Gravel

Atterberg Limits

PL= LL= PI=

Coefficients

D_{90}= 21.6781 D_{85}= 19.6310 D_{60}= 0.3236
D_{50}= 0.2319 D_{30}= 0.1077 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

Natural Moisture = 10.0%

Sample Number: B-3, S-8

Date: 11/29/16

CGC, Inc.

Client: City of Madison
Project: Capital East Ramp
Project No: C16051-25

Figure

Tested By: DRW **Checked By:** DAS

CGC, Inc.

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)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	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

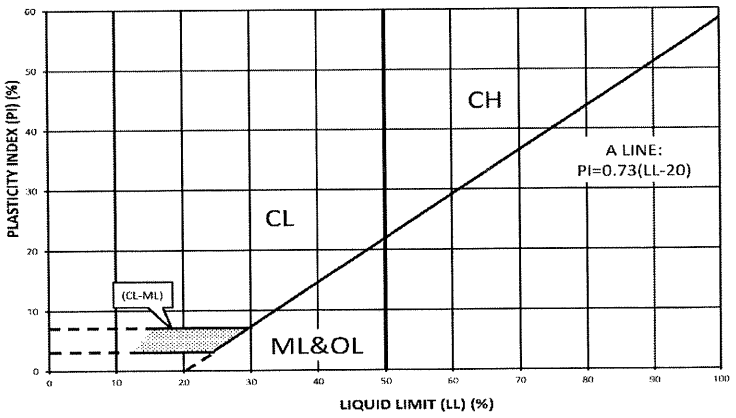
LABORATORY CLASSIFICATION CRITERIA

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 limts 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 limts 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.

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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
Within 10 ft of building lines		
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
Beyond 10 ft of building lines		
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)

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SECTION 02 41 13
SITE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Identify, disconnect, and remove designated utilities.
2. Demolish and remove designated site structures and sheds.
3. Demolish and remove designated pavements.
4. Remove designated fencing system.
5. Remove designated signage.
6. Remove demolition materials from site.
7. Temporary protection between demolition area and existing buildings or structures to remain.

B. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern Work under this Section.
2. Section 02 41 14 – Utility Abandonment and Removal: Removal or abandonment of designated site services.
3. Section 31 05 13 – Soils for Earthwork: Subsoil backfill material.
4. Section 31 05 17 – Aggregates for Site Earthwork: Granular backfill material.
5. Section 31 10 00 - Site Clearing: Site clearing outside perimeter of existing structures.

1.2 SUBMITTALS

A. Division 01 – General Requirements: Requirements for submittals.

B. Submit demolition removal procedures and schedule.

C. Submit project record documents under provisions of Division 01 – General Requirements.
1. Record drawings should accurately identify location of utilities capped off or abandoned in place, location of foundations or appurtenances abandoned and covered, or items remaining that would affect future work on site.

1.3 REGULATORY REQUIREMENTS

A. Comply with local, state, and federal codes, rules and regulations applicable to demolition work including but not limited to erosion control, air pollution, noise pollution, and waste disposal.

B. Contractor shall obtain and pay for permits required for demolition work.

1.4 PROJECT SITE CONDITIONS

A. Conduct demolition to minimize interference with adjacent structures.

B. Maintain protected egress and access at all times.

C. Provide, erect, and maintain temporary barriers and security devices.

D. Conduct operations with minimum interference to public or private thoroughfares.

E. Do not close or obstruct roadways and sidewalks without permits.

1.5 SITE DEMOLITION REQUIREMENTS

A. Traffic Control Signs:
1. Where pedestrian and driver safety is endangered in area of removal work, use traffic barricades with flashing lights.
2. Anchor barricades in a manner to prevent displacement by wind.

B. Items to Remain in Place:
1. Take necessary precautions to avoid damage to existing items scheduled to remain in place, to be reused, or to remain property of Owner.
2. Repair or replace damaged items as approved by Engineer.
3. Construct and maintain shoring, bracing, and supports as required.
4. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, or demolition work performed.
5. Do not overload pavements to remain.
6. Provide new supports and reinforcement for existing construction weakened by demolition or removal work.
7. Repairs, reinforcement, or structural replacement require approval by Engineer prior to performing such work.

C. Existing Conditions:
1. Before beginning any demolition work, survey project site and examine drawings and specifications to determine extent of demolition work.
2. Protect trees within project site which might be damaged during demolition, and which are indicated to be left in place.
3. Replace any tree designated to remain that is damaged during the work under this contract with like and kind or as approved by Engineer.
4. Maintain existing utilities indicated to stay in service and protect against damage during demolition operations.
5. Prior to start of work, utilities serving each area of alteration or removal will be shut off by Utility Owner and disconnected and sealed by Contractor.

1.6 HAZARDOUS MATERIALS

A. If Contractor encounters a hazardous material during demolition process, other than existing contaminated soils identified, it shall cease operations immediately and notify Owner and Engineer of its findings.

B. Owner will employ a Contractor, experienced and certified in removal and disposal of hazardous substances to perform removal and disposal work.

C. Contractor shall not reinstate demolition operations until areas have been cleared for continuation of demolition work.

PART 2 - PRODUCTS – (Not Used)

PART 3 - EXECUTION

3.1 NOTIFICATION

A. Contractor, prior to any excavation work, shall notify (1) a designated locating service; (2) all utilities, governmental agencies, 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.

B. In accordance with Wisconsin Statute 182.0175, "Damage to Transmission Facilities," Excavator, as defined in 182.0175(1)(bm), shall provide advance notice not less than three (3) working days before the start of nonemergency excavation to the one-call system, as defined in the statute, required to perform work contained in this Project, and further, Excavator shall comply with all other requirements of this Statute relative to Excavation.

3.2 PREPARATION

A. Prevent movement or settlement of adjacent structures scheduled to remain.

B. Provide bracing and shoring of adjacent structures scheduled to remain.

C. Protect existing landscaping materials, appurtenances and structures which are not to be demolished.

D. Disconnect, cap, and remove designated utility lines, including services within demolition areas.

E. Cooperate and work with local utility company to provide disconnection and removal of designated electrical services.

F. Mark location of disconnected utilities. Identify utilities and indicate capping locations on Project Record Documents.

3.3 DEMOLITION AND REMOVAL

A. Except where specified in other sections, all materials and equipment removed, and not reused or salvaged shall become property of the Contractor.

B. Demolish designated structures, sheds, pavements, fences, signage and appurtenances in accordance with removal procedure and schedule.

C. Cease operations and notify Engineer immediately if adjacent structures or landscape features appear to be endangered.

D. Do not resume operations until corrective measures have been taken.

E. Immediately remove demolished material from site unless approved demolition procedure and schedule submitted in accordance with this section provides otherwise.

F. Relics, antiques, and similar objects remain property of Owner.

G. Notify Engineer prior to removal and obtain acceptance regarding method of removal.

H. Remove following material and equipment to be retained by Owner and deliver to Owner.
   1. Signage.

I. Remove following material and equipment disposal off-site.
   1. Fencing.

J. Remove and promptly dispose of contaminated, vermin infested, or dangerous materials encountered.

K. Do not burn or bury materials on site.

L. Remove site structure and shed foundations and footings completely.

M. Demolish and remove designated concrete pavement completely which includes:
   1. Sidewalks.
   2. Curb and Gutter.
   3. Driveways.

N. Demolish and remove designated asphalt pavement completely which includes:
   1. Driveways.

O. Neatly saw cut pavement edges at right angle to surface to complete depth of pavement prior to shattering or mechanical removal.

P. Keep work sprinkled to minimize dust. Provide hoses and water main or hydrant connections for this purpose. Obtain permits and pay for water usage as required by Local Water Utility.

Q. Backfill areas excavated, open pits, and holes caused as a result of demolition with Type A10 fill specified in 31 05 17 – Aggregates for Site Earthwork.

R. Rough grade and compact areas affected by building demolition to maintain and blend site grades and contours as indicated on Drawings.

END OF SECTION

SECTION 02 41 14

UTILITY ABANDONMENT AND REMOVAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Abandonment in place or removal of existing below grade utility services including sanitary sewer and storm sewer.
2. Disconnection and removal of utility services at property line.
3. Abandonment or Removal of existing utility structures including but not limited to manholes, catch basins, storm inlets, clean-outs.

B. Related Sections:
1. Applicable provisions of Division 01– General Requirements shall govern Work under this Section.
2. Section 02 41 13 – Site Demolition: Demolition of designated sheds, pavements and fences.
3. Section 31 05 13 – Soils for Earthwork: Subsoil fill.
4. Section 31 05 17 – Aggregates for Site Earthwork: Granular fill.
5. Section 31 23 17 – Site Excavation, Backfill, and Compaction: Backfilling of abandoned or removed utility service excavations.

1.2 REFERENCES

A. City of Madison Standard Specifications for Public Works Construction, 2017 Edition, (SSPW).

B. State of Wisconsin Department of Transportation:
1. Standard Specifications for Highway and Structure Construction, Current Edition. (WISDOT)

C. City of Madison, Wisconsin:
1. Ordinance for Construction Site Erosion Control.

1.3 SUBMITTALS AT COMPLETION OF WORK

A. Division 01 – General Requirements: Requirements for submittals.

B. Division 01 – General Requirements:
1. Record horizontal and vertical depth locations of pipe runs, connections, and utility structures abandoned.
2. Identify, indicate, and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.4 REGULATORY REQUIREMENTS

A. Conform to following codes as applicable to abandonment and removal Work of this Project:
1. City of Madison Standard Specifications for Public Works Construction, 2017 Edition, (SSPW).

2. State of Wisconsin Administrative Code, Department of Safety and Professional Services, Chapter SPS 381 – Definitions and Standards, Chapter SPS 382 – Design, Construction, Installation, Supervision, and Inspection of Plumbing, and Chapter SPS 384 – Plumbing Products, and local code if more stringent for materials and installation of the Work of this Section.

B. Contractor shall comply with local, state, and federal regulations applicable to Work of this Section.

C. Contractor shall comply with and be solely responsible for compliance with U.S. Department of Labor OSHA Part 1926 Safety and Health Regulations for Construction for this Work.

D. Contractor performing Work of this Section shall be solely responsible for identifying, furnishing, installing and maintaining equipment and materials required by State and Federal regulations to establish safe working conditions during Work of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS FOR UTILITY ABANDONMENT IN PLACE AND REMOVAL

A. Cellular Concrete Fill:
1. Blend of preformed foam with cement-sand grout slurry to produce a concrete having fresh weight per cubic foot of not less than 75 pounds.
2. Cement-sand slurry shall be proportioned to contain 8 bags of Type 1 Portland cement per cubic yard.
3. Foam shall be similar or equal to Elastizell manufactured by Elastizell Corporation of America, Ann Arbor, MI.

B. Aggregate Slurry Backfill: As specified in Section 31 23 17 – Site Excavation, Backfill and Compaction.

C. Bulkhead Concrete:
1. 3000 psi at 28 days.
2. 3/4-inch maximum aggregate size.
3. 4-inch slump.
4. 423 pounds Portland Cement Type IA per cubic yard.

D. Crushed Stone or Gravel: Free of friable material and debris; Type A2; as specified in Section 31 05 17 – Aggregates for Site Earthwork.

E. Site Excavated (Spoil) or Imported Material: Type S1 as specified in Section 31 05 13 – Soils for Earthwork;
1. Consisting of loam, clay, gravel, sands or mixtures, for use as non-structural fill, within non-paved and non-foundation areas of project.
2. Fill requires prior approval by Engineer upon written request from Contractor.
3. Fill shall be free of pavement fragments larger than three (3) inches, bituminous or concrete materials, vegetable or organic matter, all types of refuse and frozen material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Maintain utility services until abandonment or removal work is authorized by Construction Manager.

B. Contact Municipal Utility to identify and locate point of connection of utility lateral to site service line.

C. Verify Municipal Utility requirements for disconnection and abandonment of utility service at property line. Obtain necessary permits.

D. Remove existing site utility service lines and appurtenances within proposed building footprint(s) in their entirety as indicated on Drawings.

E. Abandon or remove existing site utility service lines outside proposed building footprint(s) as indicated on Drawings.

F. Remove utility structures including, but not limited to, manholes, cleanouts, inlets, catch basins, and similar appurtenances completely.

3.2 NOTIFICATION

A. Contractor, prior to any excavation work, shall notify (1) a designated locating service; (2) all utilities, governmental agencies, 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.

B. In accordance with Wisconsin Statute 182.0175, "Damage to Transmission Facilities," Excavator, as defined in 182.0175(1)(bm), shall provide advance notice not less than three (3) working days before the start of nonemergency excavation to the one-call system, as defined in the statute, required to perform work contained in this Project, and further, Excavator shall comply with all other requirements of this Statute relative to Excavation.

3.3 SANITARY AND STORM SEWER ABANDONMENT AND REMOVAL

A. Locate and identify alignment of sanitary sewer and storm sewer utility service lines on site and their connection to Public Utility at property line.

B. Contractor shall uncover connection of utility at location indicated on drawings.

C. Securely plug existing connection where sanitary sewer and storm sewer terminates in manhole to prevent entry of construction water and debris into municipal active system.

D. Contractor shall be responsible to verify that plug(s) are in place at end of each workday.

E. Contractor shall remove any water or debris from terminal manhole as required but not less than once a week.

F. Saw cut clean vertical joint in pipe if joint is not present at point indicated on Drawings.

G. Insert a Municipal Utility approved plug in end of utility lateral. Place a concrete bulkhead against end of plug and pipe.

H. Procedure for abandonment of sanitary sewer and storm sewer site lines and appurtenances:
   1. Excavate, and dispose of properly off site, existing manholes and similar appurtenances completely from site service lines.
   2. Fill completely, abandoned reaches of pipe lines, with cellular concrete.
   3. Plug both ends of each reach of pipe with a watertight concrete bulkhead.
   4. Backfill and compact excavations as specified.

3.4 STRUCTURE REMOVAL

A. Structures shall include manholes, inlets, catch basins, and clean-outs.

B. Remove designated manholes, inlets, catch basins, and clean-outs completely, including structure footing or base.

3.5 BACKFILL AND COMPACTION

A. Place and compact backfill in accordance with Section 31 23 17 – Site Excavation, Backfill, and Compaction.

3.6 FIELD QUALITY CONTROL

A. Division 01 – General Requirements: Field inspection and testing.

B. Request inspection prior to and during placing backfill.

END OF SECTION

SECTION 03 04 05

GENERAL REQUIREMENTS FOR STRUCTURAL WORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section governs only technical specifications related to Structural Engineering designed Work.

B. Section Includes:
1. Definitions.
2. Pre-installation Meeting.
3. Submittal Procedures.
4. Quality Control Requirements.
5. Proposed Products List.
6. Product Requirements.
7. Product Data.
8. Shop Drawings.
9. Samples.
10. Test Reports.
11. Certificates.
12. Manufacturer’s Instructions.
13. Manufacturer’s Field Reports.
14. Erection Drawings.
15. Tolerances.
16. References.
17. Product Storage and Handling Requirements.
18. Protecting Installed Construction.
19. Project Closeout Procedures.

C. Related Divisions:
1. Division 03 – Concrete.
2. Division 04 – Masonry.
3. Division 05 – Metals.
4. Division 31 – Earthwork.

1.2 DEFINITIONS

A. Engineer: Designer of Structural Engineering Work.

B. Pre-installation Meeting: Meeting to discuss a product or material, typically complex in nature, and review manufacturer’s precautions, restrictions, and installation procedures.

C. Submittal Procedures: Specified requirements regarding procedures related to submission of product data, shop drawings, manufacturer’s certificates, and substitutions.

D. Quality Control Requirements: Inspection, analysis, and other relevant actions taken to provide control over what is being structurally done, manufactured, or fabricated, so that a desirable level of quality is achieved and maintained during duration of the work.

E. Proposed Product List: Prepared listing of all structural materials and products intended to be used for structural work related to concrete, masonry, structural steel, and floor and roof decking.

F. Product Requirements: Structural product information regarding manufacturer's data, preparation, fabrication, conveying and erection of structural work including material, components, and systems incorporated in work.

G. Product Data: A manufacturer's document that summarizes the performance and other technical characteristics of a structural product, material, or component in sufficient detail for assessing conformance with information given and structural design concept expressed on the structural drawings and specified in the structural specifications.

H. Shop Drawings: All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for the contractor and submitted by contractor to the structural engineer to illustrate some portion of the structural design work.

I. Samples: Physical examples of structural materials or workmanship that are representative of some portion of the structural portion of work and which establish the standards by which such portion of the structural work will be judged.

J. Test Reports: Test reports are for information for assessing conformance with information given and the structural design concept expressed on drawings and in the specifications.

K. Certificates: Indicating a material or product conforms to or exceeds specified requirements.

L. Manufacturer's Instructions: Printed instructions for delivery, storage, assembly, installation or finishing of products and materials specified, submitted to the structural engineer.

M. Manufacturer's Field Reports: Reports provided by the product or material manufacturer for information for assessing conformance with the structural design concept, submitted to the structural engineer.

N. Erection Drawings: Drawings submitted to the structural engineer for information to assess conformance with the structural design concept.

O. Tolerances: Manufacturer's recommended tolerances and tolerance requirements of reference standards specified in the structural technical specification.

P. Product Storage and Handling Requirements: The storing, protection and handling requirements of the products and materials specified in the structural technical specification.

Q. Cutting and Patching: The execution of cutting, fitting and patching to complete work including the fitting of several parts, to integrate with other work, uncovering of structural work to install ill-timed work, removal and replacement of defective and non-conforming structural work, the

removal of samples of installed structural work for performance testing purposes, and providing openings in elements of structural work for penetrations for mechanical and electrical work.

R. Protecting Installed Construction: Protecting of installed structural work with special protection to control construction activity in immediate work area to prevent damage to the structural element.

S. Project Closeout Procedures: Process of verification and documentation of required project structural records, and retention of other essential structural project documentation.

1.3 PREINSTALLATION MEETING

A. When required in individual structural specification sections, convene preinstallation meeting at project site prior to commencing work of specific section.

B. Require attendance of parties directly affecting, or affected by, Work of the specific structural specification section.

C. Notify Engineer and Owner four (4) days in advance of meeting date.

D. Prepare agenda and preside at meeting:
1. Review conditions of structural installations, preparation and installation procedures.
2. Review coordination with related work.

E. Record minutes and distribute PDF copies within two (2) days after meeting to participants, with PDF copies to Engineer and Owner and those affected by decisions made.

1.4 SUBMITTAL PROCEDURES

A. Contractor shall provide Engineer PDF copies of specific submittal information regarding structural products and materials of this specification section with extended permission of Architect.

B. Submit shop drawings and product data in PDF copies covering identified equipment and materials that will become a permanent part of structural work to Engineer for review.

C. Electronically submit material information, product data, and shop drawings in PDF format directly to dan.windorski@graef-usa.com. For questions related to submittals review and miscellaneous questions contact (608) 245-1975.

D. Structural shop drawings and product data shall include drawings, descriptive information, and sufficient detail to show kind, size, arrangement, and operation of structural component materials and devices needed for installation and coordination with other materials and systems.

E. All submittals, regardless of origin, shall be stamped with approval of Contractor and identified with name of the Project, Contractor’s name, and references to applicable technical structural specification sections and structural drawings.

F. Each submittal shall indicate intended use of item in structural work. When manufacturer data sheets are submitted, clearly identify applicable items and cross out inapplicable data.

G. Manufacturer's structural data sheets shall be current and include issue number and date.

H. Contractor's stamp of approval is a representation to Engineer that Contractor accepts full responsibility for determining and verifying all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, and that Contractor reviewed and coordinated each submittal with requirements of the structural work.

I. Contractor shall accept full responsibility for completeness of each submission. When an item consists of structural components from several sources, Contractor shall submit a complete initial submittal including all structural components.

J. Identify deviations from technical structural specifications and structural drawings on each submittal and tabulate in Contractor's letter of transmittal. Such structural submittals shall indicate details of proposed changes, including modifications to other facilities that may result from deviation, and required piping and wiring diagrams.

K. Submit PDF copies of each shop drawing and necessary product data to Engineer for review. Engineer will return two (2) marked PDF copies to Contractor.

L. Engineer will not accept submittals from anyone but the Contractor or the Architect.

M. Submittals shall be consecutively numbered in direct sequence of the structural submittal.

N. Review of Structural Shop Drawings and Structural Product Data:
   1. Engineer's review of structural shop drawings and product data will cover only general conformity to the structural drawings and technical structural specifications, external connections, and dimensions that affect layout. Engineer's review does not indicate a thorough review of all structural dimensions, quantities, and details of material, equipment, device, or item shown.
   2. Engineer's review shall not relieve Contractor of Contractor's responsibility for errors, omissions, or deviations in the structural drawings and data, or of sole responsibility for compliance with the Work.
   3. Engineer's submittal review period shall be a maximum of seven (7) days from date of submittal or resubmittal.
   4. When structural shop drawings and data are returned marked "NOT ACCEPTABLE" or "RETURNED FOR CORRECTION", Contractor shall make corrections as noted by Engineer and resubmit corrected PDF copies.
   5. When shop drawings and product data are returned marked "EXCEPTIONS NOTED" or "APPROVED AS SUBMITTED", no additional copies need be submitted unless requested by Engineer at time of review.

O. Re-submittal of Shop Drawings and Product Data:
   1. Contractor shall accept full responsibility for completeness of each re-submittal.
   2. Contractor shall verify that resubmittal provides all corrected structural data and additional information previously requested by Engineer.
   3. When corrected files are re-submitted, Contractor shall indicate in writing revisions made.

4. Requirements specified for initial submittals also apply to re-submittals.
5. Re-submittals shall bear number of first submittal followed by a letter (A, B, etc.) to indicate sequence of re-submittal.
6. Make re-submittals within seven (7) days of date of letter returning material to be modified or corrected.

P. Substitutes and "Or-Equal" Items:
1. Whenever a structural material or product is specified or described by using a single name of a proprietary product or a single name of a particular manufacturer or vendor, specified item mentioned shall be understood as establishing type, function, and quality desired.
2. Whenever two (2) or more names of proprietary products or particular manufacturers or vendors are used, it shall be understood that the structural material or product of one named supplier shall be furnished with no options or substitutions allowed.
3. Structural products, materials, or systems not specified by proprietary name and submitted as a proposed substitute shall be reviewed and approved or rejected by Engineer.
4. Cost of proposed substitution review is subject to financial reimbursement from Contractor to Engineer for time taken for review and verification in the amount of $100.00 dollars for each hour of review and verification of proposed substitution.
5. Contractor shall be liable for all costs incurred by Engineer related to each substitution review, including proposed substitutions which are rejected.

1.5 QUALITY CONTROL REQUIREMENTS

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce structural work of specified quality.

B. Comply with specified structural standards as the minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

C. Perform structural work using persons qualified to produce required and specified structural quality.

D. Structural products, materials, and systems may be subject to inspection by Engineer at place of manufacture or fabrication. Such inspections shall not relieve Contractor of complying with the structural requirements of the structural drawings and technical structural specifications.

E. Supervise performance of structural work in such manner and by such means to ensure that Work, whether completed or in progress, will not be subjected to harmful, dangerous, damaging, or otherwise deleterious exposure during construction period.

1.6 PROPOSED PRODUCT LIST

A. Within seven (7) days after date of Notice to Proceed, submit list of major structural products proposed for use, with name of manufacturer, trade name, and model number of each product.

B. For structural products specified only by reference standards, indicate manufacturer, trade name, system identification or catalog designation.

1.7 PRODUCT REQUIREMENTS

A. Structural products include material, equipment, and systems.

B. Comply with structural specifications and referenced standards as minimum requirements.

C. Components required to be supplied in quantity within a structural specification section shall be the same, and shall be interchangeable.

D. Do not use structural materials and equipment removed from existing structure, except as specifically required or allowed by the structural drawings or technical structural specifications.

E. Products Specified by Reference Standards or by Description Only: Provide any structural product meeting those standards.

F. Products Specified by Naming Two (2) or More Manufacturers: Provide structural products of the one named manufacturer meeting the structural technical Specifications; no options or substitutions allowed.

G. Products Specified by Naming One (1) or More Manufacturers or with a Provision for Substitutions: Submit a request for substitution of a proposed equal.

1.8 PRODUCT DATA

A. Product Data: Submit to Engineer for review for assessing conformance with information given and structural design concept expressed on the structural drawings and technical specifications.

B. Submit electronic submittals as PDF's files.

1.9 SHOP DRAWINGS

A. Shop Drawings: Submit to Engineer for assessing conformance with information given and structural design concept expressed on the Drawings and in structural technical specifications.

B. When required by individual structural technical specification sections, provide shop drawings signed and sealed by a professional Engineer responsible for designing components shown on Shop Drawings.
    1) Include signed and sealed calculations to support design.
    2) Submit shop drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
    3) Make revisions and provide additional information when required by authorities having jurisdiction.

C. Submit electronic submittals as PDF files to the Engineer.

D. After review, produce copies and distribute according to "Submittal Procedures" Article and for record documentation.

1.10 SAMPLES

A. Samples: Submit to Engineer for assessing conformance with information given and structural design concept expressed on the structural drawings and in the technical structural specifications.

B. Submit structural samples to illustrate functional and aesthetic characteristics of products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

C. Include identification on each sample, with full project information.

D. Submit number of samples specified in individual technical structural specification sections; Engineer will retain one (1) sample.

E. Reviewed samples that may be used in the Work are indicated in individual technical structural specification sections.

F. Samples shall not be used for testing purposes.

G. After review, produce PDF copies and distribute according to "Submittal Procedures" Article and for record documents.

1.11 TEST REPORTS

A. Submit structural reports in PDF format for Engineer's knowledge.

B. Submit structural test reports for information for assessing structural conformance with information given and design concept expressed on the structural drawings and in the technical structural specifications.

1.12 CERTIFICATES

A. Submit certification by manufacturer, installation/application subcontractor, or Contractor to Engineer, in quantities specified for structural product data.

B. Indicate structural material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on structural material or product but must be acceptable to Engineer.

1.13 MANUFACTURER'S INSTRUCTIONS

A. Submit manufacturer's installation instructions in PDF format for Engineer's knowledge.

B. Submit printed instructions for delivery, storage, assembly, installation, and finishing, to Engineer in quantities specified for structural product data.

C. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.14 MANUFACTURER'S FIELD REPORTS

A. Submit reports in PDF format for Engineer's knowledge.

B. Submit report within five (5) days of observation in PDF format to Engineer for information.

C. Submit reports for information for assessing conformance with information given and design concept expressed on the Drawings and in the structural technical specifications.

1.15 ERECTION DRAWINGS

A. Submit erection drawings in PDF format for Engineer's knowledge.

B. Submit erection drawings for information assessing conformance with information given and design concept expressed in the technical structural specifications.

C. Data indicating inappropriate or unacceptable Work may be subject to action by Engineer or Owner.

1.16 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' recommended tolerances and tolerance requirements in reference standards. When such tolerances conflict with structural drawings or technical structural specifications, request clarification from Engineer before proceeding.

C. Adjust structural products to appropriate dimensions; position before securing structural products in place.

1.17 REFERENCES

A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by date of issue current as of date for receiving Bids except where specific date is established by code.

C. Obtain copies of standards and maintain on site when required by product technical structural specifications.

D. When requirements of indicated reference standards conflict with the structural drawings or technical structural specifications, request clarification from Engineer before proceeding.

1.18 PRODUCT STORAGE AND HANDLING REQUIREMENTS

A. Store and protect structural products according to manufacturer's instructions.

B. For exterior storage of fabricated structural products, place products on sloped supports aboveground.

C. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

D. Provide equipment and personnel to store products; use methods to prevent soiling, disfigurement, or damage.

E. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

1.19 PROTECTING INSTALLED CONSTRUCTION

A. Protect installed Work and provide special protection where specified in individual technical structural specification sections.

B. Provide temporary and removable protection for installed products. Control activity in immediate Work area to prevent damage.

C. Provide protective coverings at walls, projections, jambs, of openings.

D. Use durable sheet materials to protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects.

1.20 PROJECT CLOSEOUT PROCEDURES

A. Project Record Structural Documents:
   1. Contractor shall maintain, on site, one (1) set of the following record documents:
      a. Structural Drawings.
      b. Structural Specifications.
      c. Approved Structural Shop Drawings.
      d. Structural Product data.
      e. Structural Samples.
   2. Contractor shall store Structural Record Documents separate from documents used for construction.
   3. Contractor shall record actual revisions to the structural work and maintain information concurrent with construction progress.
   4. Contractor shall legibly mark each item to record actual structural construction including:
      a. Field changes of dimensions and Drawing details.
      b. Details not on original Drawings.
      c. Submit Record Documents to Engineer at Final Inspection, including:
         1) Project Structural Drawings.
         2) Approved Structural Submittals.
         3) Project Technical Structural Specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 03 31 00

STRUCTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Structural Concrete.
2. Admixtures.
3. Curing and Treatment Requirements.
4. Floor flatness and levelness.
5. Formwork, shoring, bracing, and anchorage.
6. Concrete reinforcement and accessories.

B. Work Installed but Furnished Under Other Sections:
1. Division 04 – Masonry: Masonry accessories attached to formwork.
2. Division 05 – Metals: Metal fabrications attached to formwork.
3. Division 07 – Thermal and Moisture Protection: Flashing reglets attached to formwork.

C. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern all work under this Section.
2. Section 03 38 00 – Post-Tensioned Concrete.
3. Section 03 64 07 – Crack Injection Repairs for Parking Structures.
4. Section 07 14 07 – Fluid-Applied Waterproofing for Parking Structures.
5. Section 07 19 07 – Water Repellents for Parking Structures.
6. Section 07 90 07 – Joint Protection for Parking Structures.
7. Section 07 95 07 – Traffic Joint Expansion Assemblies for Parking Structures.

1.2 REFERENCES

A. Incorporated Guides and References:
1. American Concrete Institute (ACI):
a. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
b. ACI 304R – Guide for Measuring, Mixing, Transporting and Placing Concrete.
c. ACI 304.2R - Placing Concrete by Pumping Methods.
d. ACI 305R - Hot Weather Concreting.
e. ACI 309R – Guide for the Consolidation of Concrete.
f. ACI 347 – Guide to Formwork for Concrete.
g. ACI SP-66 – ACI Detailing Manual.
h. ACI 362.1 – Guide for the design an construction of durable concrete parking structures.

B. Specifications:
1. American Concrete Institute (ACI):
a. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials.

b. ACI 301 - Specifications for Structural Concrete.
c. ACI 303.1 – Specification for Cast-In-Place Architectural Concrete.
d. ACI 306.1 – Specification for Cold Weather Concreting.
e. ACI 308.1 – Specification for Curing Concrete.
f. ACI 315 - Details and Detailing of Concrete Reinforcement.
g. ACI 318 - Building Code Requirements for Structural Concrete and Commentary.

2. ASTM International (ASTM):
   a. ASTM A497 – Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
   b. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
   c. ASTM A704 – Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
   d. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
   e. ASTM A767 – Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
   f. ASTM A775 – Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
   g. ASTM A884 – Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
   h. ASTM A934 – Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
   i. ASTM A1064 - Standard Specification for Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
   j. ASTM C33 – Standard Specification for Concrete Aggregates.
   k. ASTM C94 – Standard Specification for Ready-Mixed Concrete.
   l. ASTM C150 – Standard Specification for Portland Cement.
   m. ASTM C157 – Standard Test Method for Length Change of Hardened Hydraulic – Cement Mortar and Concrete.
   n. ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.
   o. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
   p. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for use in Concrete.
   q. ASTM C989 – Standard Specification for Slag Cement for Use in Concrete and Mortars.
   r. ASTM C1116 – Standard Specification for Fiber-Reinforced Concrete.
   s. ASTM C1202 – Standard Test Method for Electrical Indication of Concrete’s Ability to Resist Chloride Ion Penetration.
   t. ASTM C1240 – Standard Specification for Silica Fume Used in Cementitious Mixtures.
   u. ASTM C1602 – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
   v. ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
   w. ASTM D3963 – Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars.
   x. ASTM E1155 – Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers.

y. 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.
z. ASTM E1745 – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

1.3 SUBMITTALS

A. Submit proposed mix design of each class of concrete to Engineer not later than 10 days after Notice to Proceed or 15 days prior to the first concrete placement, whichever comes first.

B. Provide test mix results for all concrete use for parking structure slabs, beams and columns. Must include ASTM C1202 and C157.

C. Submit shop drawings of reinforcing steel under provisions of Division 01 – General Requirements.
1. Initial submittal of reinforcement shop drawings shall be complete. No partial submittals will be accepted.
2. Indicate reinforcement sizes, spacings, locations and quantities of reinforcing steel, and wire reinforcement, bending and cutting schedules, splicing, supporting and spacing devices.

D. Material Certificates: For each of the following, signed by the manufacturers:
1. Cementitious materials.
2. Admixtures.
3. Waterstops.
4. Curing compounds.
5. Bonding agents.
6. Vapor retarders.

E. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
1. Aggregates.

F. Maturity Meters:
1. Manufacturer.
2. Proposed locations.

1.4 SUSTAINABLE DESIGN SUBMITTALS

A. Division 01 – General 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 local and regional materials and distance from Project site.
2. Indoor Air Quality Certificates:
a. Certify volatile organic compound content for each interior adhesive and sealant and related primer.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
   1. Provide cost data for the following products:
      a. Products with recycled material content.
      b. Local and regional products.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301, 305R, and 362.1.

B. Sustainable Design Requirements:
   1. Recycled Content Materials: Furnish materials with recycled content.
   2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

1.6 REGULATORY REQUIREMENTS

A. Conform to requirements of local, state and federal rules and regulations applicable to Work and Project location.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather Concreting
   1. Placement and curing of concrete where (1) average daily temperature for three consecutive days is less than 40 degrees F, and (2) air temperature is not greater than 50 degrees F for more than one-half of a 24-hour period from midnight to midnight shall be in accordance with ACI 306.1.

B. Hot Weather Concreting
   1. Placement and curing of concrete subject to a combination of (1) rising air temperature (generally greater than 75 degrees F) and (2) wind and low relative humidity shall be in accordance with ACI 305R.
   2. Contractor shall provide plan for minimizing exposure of concrete to adverse conditions due to combinations of high air temperature, direct sunlight, drying winds, and high concrete temperature.
   3. Protect concrete from rapid temperature drop.
   4. Pre-wet subgrade and forms.

1.8 SLAB PRE-CONSTRUCTION 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. Concrete Pumping Equipment Supplier.
7. Resident Owner Representative.

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.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Plywood Forms: Douglas Fir or Spruce-Pine-Fir species: Sound, undamaged sheets with clean true edges, exterior glue, facing material to provide finish specified.

B. Lumber: Douglas Fir or Spruce species; construction grade or better; with grade stamp clearly visible.

C. Preformed Steel Wall Forms: Minimum 16 gage thick, Vertically and horizontally matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and surface appearance.

D. Tubular Column Type: Round, spirally wound laminated fiber material; inside surface treated with release agent.

E. Form Ties For Exposed Surfaces: Plastic cone snap ties with 1-inch outside diameter by 1-inch (nominal) long cones, with no metal within 1-inch of concrete face after removal;
   1. Manufacturers:
      a. Advance Concrete Formwork, Inc.
      b. Dayton Superior.
      c. Symons - A Dayton Superior Company.
      d. Williams Form Engineering Corporation.
      e. Substitutions: As approved by Engineer.

F. Form Ties For Hidden Surfaces: Metal spreader type, removable to a depth of 1-inch from concrete face;
   1. Manufacturers:
      a. Advance Concrete Formwork, Inc.
      b. Dayton Superior.
      c. Williams Form Engineering Corporation.

d. Substitutions: As approved by [Engineer] [Engineer/Architect].

2. Contractor shall use formwork, form components and accessories provided by a single manufacturer. Intermixing of formwork, components and accessories shall not be allowed.

2.2 REINFORCING STEEL

A. Reinforcing Steel of Commercial and all Foundations: ASTM A615, 60 ksi yield grade carbon steel deformed bars; uncoated finish. Reinforcing bars to be welded shall conform to ASTM A706.

B. Reinforcing Steel of Parking Structure and Tank: A615, 60ksi yield grade carbon steel deformed bars; epoxy coated in accordance to ASTM A775 finish.

C. Welded Steel Wire Reinforcement: Deformed type, ASTM A497; in flat sheets; uncoated, finish.

D. Reinforcement Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete.

2.3 FIBER REINFORCEMENT

A. Synthetic Macro Fibers: Synthetic macro fibers engineered and designed for use in concrete, complying with ASTM C1116, Type III.
   1. Manufacturers – Macro Fibers:
      a. The Euclid Chemical Company - TUF-STRAND SF
      b. Propex Concrete Systems Corporation - Fibermesh 650
      c. W. R. Grace & Co., Construction Products Division - STRUX 90/40
      d. Substitutions: As approved by Engineer.

2.4 CONCRETE MATERIALS

A. Cementitious Materials
   1. Portland Cement: ASTM C150, gray color, Type I except as specified below.
   2. Fly Ash: ASTM C618, Class C.
   3. Ground Granulated Blast Furnace Slag: ASTM C989, Grade 100 or 120.
   4. Silica Fume: ASTM C1240.

B. Fine and Coarse Aggregates: ASTM C33.

C. Water: ASTM C1602, clean and not detrimental to concrete.

2.5 ADMIXTURES

A. Admixtures to be used in the concrete mixture shall be submitted to the Engineer for approval as part of the mixture design.

B. Chemical admixtures shall be in accordance with ASTM C494.

C. Admixtures shall be used in accordance with manufacturer's written recommendations.

D. Admixtures containing chlorides, sulfides, or nitrides are not permitted.

E. Admixtures permitted shall be supplied by a single manufacturer for project.

F. Air Entrainment Admixture: ASTM C260;
   1. Manufacturers:
      a. Axim Italcementi Group.
      b. BASF Admixtures, Inc.
      c. Grace Construction Products.
      d. The Euclid Chemical Company.
      e. Substitutions: As approved by Engineer.

G. Crystalline Waterproofing;
   1. Product:
      a. Xypex Admix, C-500.
      b. BASF MasterLife 300D.
      c. Kryton Internal Membrane.
      d. Crystalline waterproofing powder shall be added to concrete mix at time of batching at a rate of 2 perent by weight of cementitious content.
      e. Random inspections will be performed to assure compliance with batching rate.
      f. Joint waterproofing slurry and dry packs shall be manufactured by the same manufacturer.

H. Corrosion Inhibiting Admixture;
   1. Manufacturers:
      a. W.R. Grace – Type: DCI Corrosion Inhibitor. Dosage rate 3 gallons per cubic yard.
      b. Master Builders – Type: Rheocrete CNI. Dosage rate 3 gallons per cubic yard.
      c. Axim Concrete Technologies – Type: Cateol 1000 CN-CI. Dosage rate 3 gallons per cubic yard.
      d. Cortec Corporation – Type: MCI 2005NS. Dosage rate 1.5 pints per cubic yard.
      e. Substitutions: As approved by Engineer.

2.6 ACCESSORIES

A. Rebar Mechanical Splicers and Anchors:
   1. Manufacturers:
      a. Lenton Taper Threaded Splices
      b. Lenton Terminator
      c. Substitutions: As approved by Engineer.

B. Vapor Retarder: ASTM E1745; Class C, 10 mil minimum thickness, water vapor permeance rating of 0.050 perms or less;
   1. Manufacturers:
      a. Americover - Vapor Block VB 10.
      b. Fortifiber - Moistop Ultra 10.
      c. Stego Industries - Stego Wrap 10-mil.
      d. W.R. Meadows - Perminator.
      e. Substitutions: As approved by Engineer.

C. Non-Shrink Grout: Premixed compound with non-metallic aggregate, cement, water reducing and plasticizing agents; capable of minimum compressive strength of 2400 psi.

D. Dovetail Anchor Slots: Minimum 22 gage thick galvanized steel; foam filled; release tapes; sealed slots; bent tap anchors;
   1. Manufacturers:
      a. Dur-O-Wal, Inc. – A Hohmann and Barnard Company: DA100.
      b. Heckman Building Products, Inc. #100.
      c. Hohmann & Barnard - #305.
      d. Substitutions: As approved by Engineer/Architect.

E. Flashing Reglets: Stainless steel; longest possible lengths; alignment splines for joints; foam filled; release tape; sealed slots; securable to form work;
   1. Manufacturers: Stainless Steel;
      a. Fry Reglet Company – "CO" Concrete Reglet.
      b. Heckman Building Products, Inc. - #231 Stay Put Reglet.
      c. Hohmann & Barnard - CR - Concrete Reglet.
      d. Substitutions: As approved by Engineer/Architect.

F. Waterstops: Polyvinylchloride; minimum 3/16 inch thick by 6-inch wide; large center bulb at expansion joints; heat sealed joints;
   1. Manufacturers:
      a. Greenstreak Group, Inc.
      b. Vinylex Waterstop and Accessories.
      c. W.R. Meadows, Inc.
      d. Substitutions: As approved by Engineer/Architect.

G. Waterstops: Cold Joint Type;
   1. Manufacturers:
      a. Cetco - Waterstop RX.
      b. Greenstreak Group, Inc. - Swellstop Waterstop.
      c. JP Specialties, Inc. - Type 20 & 23.
      d. Substitutions: As approved by Engineer/Architect.

H. Joint Filler: ASTM D1751, Bituminous fiber, 1/2-inch wide by depth of concrete less 1/8-inch.

I. Form Release Agent: Colorless material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating, intended for use on concrete;
   1. Manufacturers:
      a. BASF Construction Chemicals, LLC - Building Systems: Castoff.
      b. Dayton Superior - Clean Strip Ultra (J-3).
      c. W.R. Meadows - Duogard.
      d. Substitutions: As approved by Engineer/Architect.

2.7 CURING AND TREATMENT MATERIALS

A. Water: Potable and clean.

B. Burlap shall be clean, evenly woven, free of encrusted concrete or other contaminating materials, and shall be reasonably free of cuts, tears, broken or missing areas.

2.8 CONCRETE MIXTURE

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture of field test data, or both, according to ACI 301.

B. Limit cementitious materials to values indicated in ACI table 4.2.3. Indicate compliance in proposed design.

C. In designing the concrete mixtures used in the parking slabs, ramps and columns, beams and walls supporting such slabs conform to the recommendations of ACI 362 1.R, unless otherwise shown on the drawings or specified herein.

D. Limit water-soluble, chloride-ion content in hardened concrete to values indicated in ACI 318, Table 4.4.1. Indicate compliance in the proposed mix designs.

E. Mix concrete in accordance with ASTM C94.

F. Concrete mix designs shall be designed and submitted in accordance with Division 01 and included as part of cost of this Work.

G. Mix designs shall be prepared by a qualified agency acceptable to Engineer. One (1) copy of mix designs shall be submitted for Engineer's review prior to placing any concrete.

H. Mix design shall indicate brands, types, and quantities of admixtures included, compressive strength, slump, sieve analysis for fine and coarse aggregate, quantities of all ingredients, type and brand of cement, source of aggregate, whether fine aggregate is natural or manufactured.

I. Design of mix shall assure placing and finishing characteristics that meet Project requirements.

J. Mix designs contained in the Schedule of Mixes may be modified and submitted to Engineer for approval, by use of mid or high range water reducing admixtures to control slumps required for pumping of concrete. Strength, placing and finishing requirements shall be maintained.

K. Concrete mixtures placed directly over vapor retarders shall be designed to have low shrinkage characteristics and designed to minimize slab curling.

L. Initial and final set times of concrete mix designs shall be coordinated between the contractor and concrete supplier.

M. Perform test batches as required to correlate with maturity meters.

2.9 SCHEDULE OF MIXES

A. Footings, Pile Caps: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 4000 psi.
   2. Maximum Aggregate Size: 1-1/2 inches.
   3. Maximum Water-Cement Ratio: 0.50.

B. Fill for Pipe Piles: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 3500 psi.

2. Maximum Aggregate Size: 3/4 - inch.

C. Columns at Commercial: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 5000 psi.
   2. Maximum Aggregate Size: 3/4 - inch.

D. Beams, Joists, Walls, Shear Walls, Structural Slabs at Commercial: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 6000 psi.
   2. Maximum Aggregate Size: 3/4 - inch.

E. Foundation Walls, Grade Beams: 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 is required with an acceptable air content of plus or minus 1.5 percent.

F. Interior Slab-on-Ground, Equipment Pads: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 3000 psi.
   2. Maximum Aggregate Size: 3/4 - inch.

G. Exterior Slab-on-Ground, Parking Slab on Grade, Equipment Pads: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 3000 psi.
   2. Maximum Aggregate Size: 3/4 - inch.
   3. Maximum Slump (Inch): 3
   4. Maximum Water-Cement Ratio: 0.50.
   5. Air Entrainment: 6 percent air content is required with an acceptable air content of plus or minus 1.5 percent.

H. Stair Pans and Landings: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 3000 psi.
   2. Maximum Aggregate Size: 3/8 - inch.
   3. Maximum Slump (Inch): 3
   4. Maximum Water-Cement Ratio: 0.50.

I. Sanitary Structures (Storm water tank walls and mat, Elevator pit walls and mat): Proportion sulfate-resistant concrete mix as follows:
   1. Compressive Strength (28 Days): 4000 psi.
   2. Maximum Aggregate Size: 3/4 - inch.
   3. Maximum Slump (Inch): 3
   4. Minimum Cement Content: 470 lbs.
   5. Minimum Flyash Content: 100 lbs.
   6. Air Entrainment: 6 percent air content is required with an acceptable air content of plus or minus 1.5 percent.
   7. Maximum Water-Cement Ratio: 0.45.
   8. Xypex C-500 at 3% of cementitious content (Substitutions as approved by Engineer)

J. Parking Structure - Columns: Proportion normal-weight concrete mix as follows:
   1. Compressive Strength (28 Days): 6000 psi.

2. Maximum Aggregate Size: 3/4 - inch.
3. Air Entrainment: 6 percent air content is required with an acceptable air content of plus or minus 1.5 percent.
4. Maximum Water-Cement Ratio: 0.42.
5. Bid Alternate: Crystalline Waterproofing.
6. Corrosion Inhibitor

K. Parking Structure – Elevated Slabs, Joists, Beams, Elevated Barrier Walls: Proportion normal-weight concrete mix as follows:
1. Compressive Strength (28 Days): 6000 psi.
2. Maximum Aggregate Size: 3/4 - inch.
3. Air Entrainment: A minimum of six (6) percent air content is required with acceptable range of air content is plus or minus 1.5 percent.
4. Maximum Water-Cement Ratio: 0.40.
5. Alternate No. 1: Crystalline Waterproofing.
6. Flyash Content: Minimum 50 lbs./yd, Maximum 100 lbs./yd.
7. Slag Content: Minimum 50 lbs./yd, Maximum 100 lbs./yd.
8. Silica Fume Content: Minimum 0 lbs./yd, Maximum as approved by Engineer.
9. Maximum Chloride Absorption per ASTM C1202: 1500 coulumbs.
10. Corrosion Inhibitor
11. Shrinkage shall not exceed 0.04% per ASTM C157 at 28 days.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits stated below.

C. Verify lines, levels, and measurement before proceeding with formwork.

D. Earth forms are not permitted.

E. Align form joints.

F. Do not apply form release agent where concrete surfaces receive special finishes or applied coatings which may be affected by agent.

G. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

H. Provide ¾” x ¾” chamfer strips for all exposed concrete corners of formwork.

I. Use mechanical rebar splicers and anchors in order to reduce congestion.

3.2 REINFORCEMENT

A. Place, support, and secure reinforcement against displacement.

B. Locate reinforcing splices as shown on Drawings.

C. Cut ends of epoxy coated rebars shall be coated with epoxy material equivalent to factory coating.

D. Damage to rebar coating as a result of bending shall be repaired with equivalent coating.

3.3 VAPOR RETARDERS

A. Vapor retarders shall be provided where slabs will receive vapor-sensitive floor coverings or in humidity-controlled areas or as indicated on drawings.
   1. Install vapor retarders directly under concrete slab-on-ground at areas with vapor-sensitive floor coverings and where subgrade granular material is subject to future moisture infiltration.
   2. Where subgrade material is dry, and will not be subject to future moisture infiltration and where humidity will be controlled, place the vapor retarder beneath the dry granular material and the concrete slab-on-ground directly on the dry granular material.

B. Installation of Water Vapor Retarders shall be in accordance with ASTM E1643.

C. Edges shall be lapped six (6) inches and sealed.

D. Contractor is responsible for maintaining conditions to provide a dry subgrade material where the slab is cast on top of granular material.

E. Contractor is responsible for maintaining a puncture free vapor retarder. Any punctures shall be sealed appropriately to prevent vapor transmission.

F. Do not disturb vapor retarder while placing reinforcement.

3.4 PLACING CONCRETE

A. Notify Engineer a minimum of 48 hours prior to commencement of concreting operations.

B. Failure to notify Engineer may result in rejection of concrete placed without observation.

C. Place concrete in accordance with ACI 301.

D. Place pumped concrete in accordance with ACI 304.2R. Line coating mix to initiate pumping shall not be used in pour but shall be wasted.

E. Ensure reinforcement and embedded items are not disturbed during concrete placement.

F. Concrete with excessive honeycomb or embedded debris shall be rejected and replaced at no cost to OWNER.

G. Application of surface retarders and sawcutting of joints shall be planned in advance.

H. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.

I. Placing During Hot Weather:
   1. Place concrete during hot weather conditions in accordance with ACI 305R.

J. Placing During Cold Weather:
   1. Place concrete during cold weather conditions in accordance with ACI 306.1.

K. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.5 FLOOR SLABS

A. Place floor slabs-on-ground with contraction and construction joints as indicated on Drawings.

B. Saw cut contraction joints as soon as possible, without raveling, after placement of concrete, but within 24 hours.

C. Cut slabs with 3/16-inch thick blade, cutting one-fourth depth of slab thickness.

D. Separate slabs on fill from vertical surfaces with a joint filler.

E. Extend joint filler from bottom of slab to within 1/8-inch of finished slab surface.

F. Parking shall be floated and broom finished in accordance with ACI 302.1R. Immediately after finishing, begin curing.

G. Commercial and security office floor finish shall be single toweled.

3.6 FLOOR CURING AND TREATMENT

A. Wet burlap curing shall begin promptly to prevent drying of concrete. Moist curing shall continue for seven (7) days after placing.

B. Do not allow concrete to cool rapidly.

C. Keep forms covered and burlap continually moist during the first seven (7) days of the curing period.

D. Verify compatibility of floor treatment materials with mastics and finish materials to be applied to floor.

E. Provide a moist cure for a full seven (7) days through the use of burlap. Material shall completely cover the concrete surface and shall be weighted down to prevent shifting due to wind or other factors.

3.7 REPAIR OF VERTICAL SURFACE DEFECTS

A. Upon stripping of forms, vertical surfaces shall be inspected for defects caused by surface air voids, honeycombing, form tie holes, peeling, and fins.

B. Surface air voids shall be repaired with a unit packaged mixture of sand and cement mixed on job site with water and a unit of acrylic. Mixture shall be brushed uniformly on to surface and into voids. Where surface is to be exposed, surface finish of repair shall match adjacent surface. Final appearance of exposed concrete shall be approved by Engineer and Owner.

C. Honeycombed and other defective concrete shall be removed down to sound concrete and patched to match adjacent surfaces.

3.8 FINISHING OF FORMED SURFACES

A. After removal of forms and repair of defects, surfaces of concrete shall be given finishes specified below.

B. When finish is to match a sample furnished to Contractor, sample finish shall be reproduced on an area at least 100 square feet in size in an inconspicuous location designated by Engineer prior to application in the specified area. Application of finish shall not be made until approved by Engineer.

C. Rough Form Finish: Surface left with texture imparted by forms; form facing material not specified; tie holes and defects shall be patched; fins exceeding 1/4-inch shall be chipped or rubbed off.

D. Smooth Form Finish: Surface produced by form facing material shall be a smooth, hard, uniform texture on concrete; forms may be plywood, tempered form grade hardboard, metal, plastic, paper or other acceptable material capable of producing finish; arrangement of facing material shall be orderly and symmetrical with number of seams kept to practical minimum; forms supported to prevent deflection and to maintain tolerances; tie holes and defects shall be patched; all fins shall be removed.
   1. Grout Cleaned Finish: produced on newly hardened concrete following form removal; no cleaning operation shall be undertaken until all contiguous surfaces to be cleaned are completed and accessible; cleaning as work progresses is not permitted; mix 1 part portland cement to 1-1/2 parts fine sand with sufficient water to produce grout having consistency of thick paint; white portland cement may be substituted for a part of gray cement to produce a color to match adjacent concrete as determined by a trial patch; wet surface of concrete sufficient to prevent absorption of water from grout and apply grout uniformly with brush or spray gun; immediately after applying grout, scrub surface vigorously with a cork float or stone to coat surface and fill all air bubbles and holes; while grout is still plastic, remove excess grout by working surface with rubber float, burlap or other acceptable means; after surface whitens (approximately 30 minutes normal drying), rub vigorously with clean burlap; keep surface damp for at least 36 hours after final rubbing. Final appearance shall be approved by Engineer and Owner.

E. Tops of walls or buttresses, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of formed surface.

F. Final finish on formed surfaces shall continue uniformly across unformed surfaces.

G. Where a schedule of finishes is not included in this Section, or finishes are not shown on Drawings, the following finishes shall be used as applicable: Rough Form Finish for all concrete surfaces not exposed to public view; Smooth Form Finish with Grout Cleaned Finish for all concrete surfaces exposed to public view.

3.9 TOLERANCES

A. All tolerances for concrete work shall be in accordance with ACI 117.

B. Contractor shall employ construction techniques to provide the following tolerances:

	Overall		Local Minimum	
	FF	FL	FF	FL
1. Elevated Slabs of Commercial	20	15	15	10

C. Contractor shall set forms consistent with and is solely responsible for meeting requirements of F-numbers specified above.
   1. F-Number testing for elevated slabs shall be conducted prior to removal of forms.

D. All floors not conforming to these requirements shall be corrected by replacement or other methods approved by Engineer.

3.10 FIELD QUALITY CONTROL

A. Use of maturity meters for elevated slab pours is required to monitor concrete strength in order to stress tendons as soon as possible.

B. Elevated slabs shall have on site test pours. Tests shall set level of final appearance and be approved by Engineer and Owner prior to additional concrete elevated slab pours.

C. Testing and analysis of concrete shall be performed under provisions of Division 01.

D. Testing firm will cast test cylinders and perform slump and air entrainment tests in accordance with ACI 301.

E. Three concrete test cylinders shall be cast from each increment of 100 cubic yards of each class of concrete placed each day or from each placement of each class if less than 100 cubic yards.

F. During hot or cold weather, as defined in Section 1.6, one additional test cylinder shall be cast from each increment of 100 cubic yards of each class of concrete placed each day or from each pour of each class if less than 100 cubic yards and be cured on site under same conditions as concrete it represents.

G. One slump test will be taken for each set of tests cylinders cast and whenever consistency of concrete appears to vary.

H. No water may be added to the concrete at the site unless pre-approved in writing by the Engineer for that specific mix. If pre-approved, the mix ticket must state how much water may be added.

I. Crystalline Waterproofing Mixture:
   1. Ready Mix Plant-Dry Batching Operation:
      a. Add mixture powder to drum of ready-mix truck, then add 60 percent to 70 percent of required water along with 300-500 lbs. of aggregate.
      b. Confirm mixture meets requirements of waterproofing manufacturer.
      c. Mix materials 2 to 3 minutes to ensure even distribution throughout mix.
      d. Add balance of materials to ready-mix truck and mix in accordance with ACI standards.
   2. Ready Mix Plant-Central Mix Operations:
      a. Mix admixture with water to form a thin slurry, 15 to 20 lbs. of powder mix with 3 gallons of water.
      b. Pour required amount of material in drum of ready-mix truck.
      c. Batch remaining aggregate, cement and water and mix at plant in accordance with ACI standards.
      d. Pour concrete into truck and mix for at least 5 minutes to ensure even distribution of admixture throughout concrete.
   3. Comply with manufacturer's instructions for use and special installation requirements of admixture.

3.11 PREPARATION OF EXISTING WORK

A. Drill holes in existing concrete, insert steel dowels and pack with non-shrink grout where new concrete is doweled to existing concrete work.

B. Prior to placement of new concrete clean with steel brush and apply bonding agent in accordance with manufacturer's instructions.

END OF SECTION

SECTION 03 35 43

POLISHED CONCRETE FINISHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grinding of the interior concrete slab surface to receive clear reactive, penetrating liquid hardener/densifier.

B. Application of clear reactive, penetrating liquid hardener.

C. Progressive polishing of the interior concrete slab surface to achieve required finish.

D. Application of sealer.

1.2 RELATED REQUIREMENTS

A. Section 03-3000 - Cast-in-Place Concrete: Concrete mix design and floor flatness requirements.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with concrete floor placement and concrete floor curing.

B. Pre-Installation Conference: Before concrete pour, Contractor shall hold a meeting to discuss the placement of concrete, controls in place to achieve required floor flatness, review of concrete mix design, schedule and sequence for concrete hardener application, grinding, and polishing activities, protection of floor surface, and coordination with other building trades.

1. Notify Owner's representative and Architect two weeks prior to meeting.

1.4 SUBMITTALS

A. Product Data: Manufacturer's published data on products to be used for the work. Include physical and performance properties of materials.

B. Concrete Mix Design: Coordinate with Section 03-3000. Indicate color of cement materials, and color and size of aggregate. Provide information on moisture cure methods, to avoid streaking or ghosting of concrete.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Installer shall have five years documented experience for polishing concrete, and shall be certified by manufacturer of product used.

B. General Contractor shall protect concrete floors from constuction activity stains, including but not limited to oil, rust, and chalk lines.

C. Floor Flatness: As specified in Section 03-3000.

1.6 MOCK-UP

A. Mock-Up Size: 30 feet square. Polish floor area for review by Architect and Owner. Floor area shall achieve semi-polished appearance. Remainder of polished floor areas shall match gloss level of approved finish.

B. Locate where directed.

C. Mock-up may remain as part of the work.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

B. Store containers in a well-ventilated area between 40 and 100 degrees F. Do not expose materails to freezing conditions.

1.8 FIELD CONDITIONS

A. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature, humidity, and ventilation requirements.

B. Apply when surface and air temperatures are between 40 and 95 degrees F. Surface and air temperatures shall remain above 40 degrees F for a minimum of 8 hours after application.

1. Temporary Heat: Maintain ambient temperatures at a minimum of 50 degrees F.

PART 2 PRODUCTS

2.1 CONCRETE FLOOR FINISH APPLICATIONS

A. Penetrating Concrete Hardener/Densifier: Lithium silicate hardener/densifier.

1. Product:

a. 3M; Scotchguard Stone Floor Protector.

b. L.M. Scofield Company; Scofield Formula One Lithium Densifier MP: www.scofield.com

c. PROSOCO, Inc; Conolideck LS: www.prosoco.com

d. W.R. Meadows; LIQUI-HARD; www.wrmeadows.com

B. Clear Sealer/Concrete Enhancer: Water based sealer/enhancer as recommended by hardeener/densifier manufacturer to provide stain resistance to semi-gloss, satin finish of polished concrete floor.

C. Grinding/Polishing Equipment: As recommended by manufacturer of concrete polishing system.

1. Provide dust extraction system including HEPA filtration vacuum.

2. Provide hand grinder or stand-up edger for edge grinding/polishing.

3. Diamond Grinding Segments:

a. Metal Bonds: 40, 60, 80 and 150 grit.

4. Diamond Polishing Pads:

a. Resin Bonds: 100, 200, 400, 800, 1500, and 3000 grit.

D. Finish: Level 3, Semi-polished.

E. Coefficient of Friction: Greater than 0.60, when tested to ANSI B101.1 Test Method for Wet Static Coefficient of Friction of a Hard Surface.

PART 3 EXECUTION

3.1 GENERAL

A. Apply materials in accordance with manufacturer's instructions.

B. Concrete shall be a minimum of 28 days old.

3.2 CONCRETE POLISHING

A. First Pass: Use 80-grit or manufacturer's recommended grit metal bond grinding segment, and grind floor surfaces at rate recommended by manufacturer. Vacuum clean floor.

B. Second Pass: Use 150-grit or manufacturer's recommended grit metal bond grinding segment, and grind floor surface at rate recommended by manufacturer. Vacuum clean floor.

C. Flood surface with concrete densifier at rate recommended by manufacturer. Scrub into floor per manufacturer's written instructions. Do not allow densifier to puddle. Squeegee off excess materials.

D. Allow floor to dry a minimum of 24 hours.

E. Third Pass: Use 100-grit or manufacturer's recommended grit resin bond polishing segment, and grind floor surface at rate recommended by manufacturer. Vacuum clean floor.

F. Fourth Pass: Use 200-grit or manufacturer's recommended grit resin bond polishing segment, and grind floor surface at rate recommended by manufacturer. Vacuum clean floor.

G. Fifth Pass: Use 400-grit or manufacturer's recommended grit resin bond polishing segment, and grind floor surface at rate recommended by manufacturer. Vacuum clean floor.

H. Sixth Pass: Use 800-grit or manufacturer's recommended grit resin bond polishing segment, and grind floor surface at rate recommended by manufacturer. Vacuum clean floor.

I. Additional Pass: Review finish with Architect and Owner's representative. If required finish level has not been achieved, Contractor may be required to provide an additional pass using a higher grit resin bond polishing segment. Grind floor surface at rate recommended by manufacturer. Vacuum clean floor.

J. Clean floor per manufacturer's instructions with white non-woven pads.

K. Allow 24 hours to pass after cleaning prior to providing concrete sealer/enhancer.

L. Spray apply concrete enhancer/sealer at rate recommended by manufacturer.

M. Lightly wet a clean microfiber pad with enhancer/sealer. Using damp pad, uniformly spread enhancer/sealer. Do not allow enhancer/sealer to dry before spreading is complete. Do not over apply.

N. Allow enhancer/sealer to dry. Apply a second coat if recommended by manufacturer, perpendicular to the first coat.

O. When dry, burnish floor with manufacturer's recommended burnishing pad.

3.3 **PROTECTION**

A. After completion of burnishing of concrete floor, keep surfaces dry for a minimum of 48 hours.

B. Do not allow traffic over floors for a minimum of 72 hours.

C. Contractor will be responsible to maintain finished floor. Provide breathable construction floor protector acceptable to concrete polisher, to complete other work over finished floors.

END OF SECTION

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SECTION 03 38 00

POST-TENSIONED CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Cast-in-place post-tensioned concrete framing members and slabs.
2. Sheathing-covered tensioning tendons for unbonded system.

B. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern all work under this Section.
2. Section 03 31 00 - Structural Concrete: Concrete product and execution requirements.

1.2 REFERENCES

A. American Concrete Institute (ACI):
1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 - Specifications for Structural Concrete.
3. ACI 318 - Building Code Requirements for Structural Concrete.
4. ACI 423.6 - Specification for Unbonded Single-Strand Tendons.

B. ASTM International (ASTM):
1. ASTM A416 - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
2. ASTM A421 - Standard Specification for Uncoated Stress-Relieved Steel Wire for Prestressed Concrete.
3. ASTM A722 - Standard Specification for Uncoated High-Strength Steel Bars for Prestressing Concrete.
4. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens).

C. American Welding Society (AWS):
1. AWS B2.1 - Specification for Welding Procedure and Performance Qualification.

D. Concrete Reinforcing Steel Institute (CRSI):
1. CRSI - CRSI Design Handbook.

E. Post Tensioning Institute (PTI):
1. PTI - Post-Tensioning Manual.
2. PTI - Specification for Unbonded Single Strand Tendons.

1.3 DESIGN REQUIREMENTS

A. Size components to withstand dead loads and live loads as required by Wisconsin Enrolled Commercial Building Code in unrestrained condition.

B. Required post-tensioning forces shown on the Drawings are the final effective forces after all short-term and long-term losses. The numbers and sizes of tendons actually provided shall be determined by the post-tension supplier.

C. Maximum Allowable Deflection: 1/240 span.

D. Design members exposed to 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.

E. Design framing members in accordance with ACI 301, ACI 318, ACI 117, and PTI Post-Tensioning Manual.

F. Design deformed bar concrete reinforcement work in accordance with CRSI Handbook.

G. Design system to accommodate construction tolerances, deflection of other building structural members, and clearances of intended openings.

1.4 SUBMITTALS

A. Division 01 – General Requirements: Submittal procedures.

B. Manufacturer's Data: Submit copies of manufacturer's specifications and installation instructions for all proprietary materials and reinforcement accessories.
   1. Submit for record manufacturer's strand relaxation losses (for low relaxation type material) and relaxation tests of representative samples per ASTM A416 and ASTM E328.
   2. Submit for record copies of watertightness test, of encapsulated post-tensioning assembly.
   3. Demonstrate ability to remain watertight when subjected to hydrostatic pressure of 1.25 psi over 24-hour period. Such tests shall be of encapsulation system proposed for use on this project and shall have been tested within two (2) years of bid date.
   4. Submit for review and approval written description of specific methods post-tensioning manufacturer and Contractor plan to incorporate to comply with transportation and handling requirements for tendons as outlined in this Section.
   5. Type and chemical analysis of corrosion inhibitive coating, to document with PTI "Specifications for Unbonded Single Strand Tendons."
   6. Type, material, and thickness of post-tensioning repair tape.
   7. Identification system for positive identification of low relaxation strand.
   8. Other features, including methods and materials for providing watertight seal at ends of tendons in order to completely encapsulate tendon.

C. Samples: Submit two (2) samples of all post-tensioning materials.

D. Shop Drawings: Indicate layout, tendon sizes, grouping, spacing, horizontal and vertical locations, placing sequence, supports and locations, tendon supports, accessories, clearances

required for jack, and pressure plate stresses signed and sealed by Professional Engineer licensed in the State of Wisconsin.

E. Indicate formwork methods, materials, arrangement of joints, ties, shores, location of bracing and temporary supports, and schedule of erection and stripping.

F. Describe tensioning sequence, type of jack, pressure monitoring device, anchorage set, tendon elongation and tendon cut-off procedures.

G. Calculations: Submit calculations as follows for review and acceptance by the Architect/Engineer along with the shop drawings for each portion of the work. All shop drawings and calculations shall be signed and sealed by a Professional Engineer registered in the State of Wisconsin.
   1. Average final effective force in each tendon after all losses. Calculated final effective force at any point along a tendon profile shall not be less than 90 percent, nor greater than 115 percent, of the average final effective force in the tendon. Additional short tendons may be added at Contractor's option and expense to overcome the effect of losses at points distant from stressing points. Anchorage and long term losses shall be based on substantiating data acceptable to Architect/Engineer. In the absence of such data, calculate anchorage and long term losses based on the following:
      a. Seating loss = 1/4 inch
      b. Shrinkage strain in concrete = 0.00063 in./in.
      c. Creep strain in concrete = 3.67 times elastic strain in concrete upon anchorage.
      d. Relaxation in tendons = 0.05 times strain in tendon upon anchorage.
   2. Modulus of elasticity of concrete shall be based on 57000*fc'^1/2(ksi), where fc'=strength of concrete at time of stressing. Initial prestress and volume to surface ratio shall be based on the effective cross section of member(s) investigated.
   3. When calculated losses due to a Contractor selected stressing layout/sequence fall outside the specified range, Contractor must notify Architect/Engineer in writing as soon as practical. A variable tendon force calculation will be performed for affected members only, and respective schedules adjusted as necessary.
   4. Friction losses along tendon shall be calculated in accordance with ACI 318, paragraph 18.6.2, including effects of both horizontal and vertical curvature and based on friction and wobble coefficients determined from field tests on other projects of similar size, proportions, material properties, and construction techniques, made within the last year and acceptable to Architect/Engineer.
   5. Size and number of tendons required to achieve the final design forces indicated on drawings based on average final effective force per tendon computed above. Neither tendon quantities nor final design forces indicated on design drawings shall be decreased.

H. Product Data: Submit data on concrete design mix and admixtures.

I. Manufacturer's Certificate: Certify tendon strength characteristics meet or exceed specified requirements.

J. Certificate of jack calibration, identifying calibration method.

1.5 SUSTAINABLE DESIGN SUBMITTALS

A. Division 01 – General 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.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
   1. Provide cost data for the following products:
      a. Products with recycled material content.
      b. Regional products.

1.6 CLOSEOUT SUBMITTALS

A. Division 01 – General 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.

1.7 QUALIFICATIONS

A. Design post-tensioned members under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Wisconsin.

B. Installer: Company specializing in constructing the Work of this section with minimum five (5) years documented experience.

C. Welder: Qualified within previous 12 months in accordance with AWS B2.1.

1.8 PRE-INSTALLATION MEETINGS

A. Division 01 – General Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

C. Discuss tendon locations, sleeve locations, and cautions regarding cutting or core drilling.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Post-tensioning tendons which are to be used within the same member (e.g. a beam) or group (e.g. slab area) shall be fabricated from same heat of strand and tagged accordingly.

B. Material shall be packaged at source in a manner which prevents physical damage to the strand during transportation and protects material from moisture or corrosion during transit and storage.

C. Tendon sheathing shall be protected from damage at all times. Contact with metal binding, ties, slings, etc. shall be avoided. Handle with nylon slings and provide padding as required to prevent tearing of sheathing. Tendons arriving at job site with sheathing damage over more than two (2)

percent of its length or damage at a single location greater than 4 inches or 2 square inches in area, whichever is less, shall be rejected. Damaged length need not be continuous. Tendons damaged beyond limits above are considered not repairable in the plant or field.

D. Protect post-tensioning steel, end anchorages and wedges against damage and rust or other results of corrosion at all times from manufacture to final stressing. Material that has sustained physical damage at any time will be rejected.

E. Remove and replace at no cost to Owner, tendons which are broken or show fabrication defects or are rejected by Contractor, Architect or Testing Agency's inspector.

F. Tendons shall be stored protected from environmental effects by the manufacturer prior to shipping. Tendons shall be shipped in weatherproof enclosures. Tendons shall be stored at job site above ground in weatherproof enclosures, to ensure that tendons remain dry until they are placed in the formwork. Covering tendons with tarps is not considered a weatherproof enclosure. Tendon delivery and storage not in conformance with these weather protection requirements shall be considered grounds for rejection and replacement of said tendons.

1.10 COORDINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Coordinate the Work of framing components not post- tensioned but associated with the work of this Section.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

A. Division 01 – General Requirements: Requirements for sustainable design compliance.

B. 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.

2.2 FORMWORK

A. Formwork: As specified in Section 03 31 00 – Structural Concrete.

2.3 REINFORCEMENT

A. Tendon Strand: Factory assembled, complying with PTI "Specification for Unbonded Single Strand Tendons," ASTM A416, Grade 270 low relaxation stranded steel cable; full length without splices; ultimate tensile stress of 270 ksi seven wire strand, greased and covered with polyethylene sheathing providing free movement of tendon within sheathing; complete with end anchorages. Use 1/2" diameter or 0.6" diameter tendons.

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. Sheathing for Unbonded Tendons:
   1. Tendons and anchorages shall be completely encapsulated in sheathing with following properties:
      a. Sufficient strength and durability to withstand irreparable damage during fabrication, transport, installation, concrete placement and tensioning.
      b. Watertightness over the entire length of sheathing.
      c. Chemical stability without embrittlement or softening over the anticipated exposure temperature range and service life of the structure.
      d. Non-reactive with concrete, steel and tendon corrosion preventive coating.
      e. Sheathing thickness for tendons shall not be less than 0.050 inches for medium or high density polyethylene or polypropylene.
      f. A continuous encapsulating sheathing installed at supplier's plant to be extended to and connected to dead, intermediate and stressing end anchorages.
      g. Continuous sheathing shall be connected by installer in the field to intermediate and stressing end anchorages.
      h. The tendon sheathing, anchorages, connecting sleeves and trumpets and end seals must provide continuous, watertight protection and prohibit direct contact of concrete and ferrous reinforcing metals from end-anchor, inclusive. This system shall have a positive mechanical means of interconnecting system elements such as threads, snaps, clamps, or gaskets and shall be approved by Architect. A friction fit or taping of adjoining system elements is not considered a positive mechanical connection.
      i. Tendon sheathing shall have a bright color easily distinguishable from the epoxy coated and black reinforcement.

2.4 ACCESSORIES

A. Tie Wire: Minimum 16 gage annealed type vinyl coated.

B. Chairs, Bolsters, Bar Supports, Spacers: Size and shape for strength and support of reinforcement during tendon location, installation, and placement of concrete; plastic tipped or non-corroding.

C. Connecting Sleeves and Trumpets:
   1. Connecting sleeves and trumpets shall be translucent or transparent to allow for visual verification of the absence of air void.
      a. Sheathing shall be continuous over tendon length. Tears, or damage to sheathing material that would permit the entrance of cement paste into tendon, shall be repaired with pressure-sensitive, waterproof tape or re-sheathed prior to placement of concrete.
      b. Sheathing repairs shall be recorded and approved by the Testing Agency.

D. Post-Tensioning Corrosion Inhibitive Coating:
   1. Lithium-based, containing corrosion inhibitors, wetting agents, and meeting requirements of Chapter 5 of the "Specification for Unbonded Single Stand Tendons."
   2. Approved products are as follows:
      a. "Greasrex K218," Mobil Oil Company.
      b. "Viscono Rust 3166," Viscosity Oil Company.
      c. "Unocal PT1 Cable Grease," Unocal Corp., Schaumburg, IL.
      d. "Shell PT Coating," Shell Oil Co., Oakbrook, IL.

e. Approved Equivalent.

3. Post-Tensioning System Manufacturer shall provide Post-Tensioning Contractor with adequate quantity of a corrosion inhibitive coating for re-application on tendons with damaged sheathing, filling voids between ends of sheathing, or waterproofing anchorages.

E. Repair Tape:

1. Adhesive high density polyethylene, 12 mils minimum thickness, 2 inches minimum width. Approved repair tapes are as follows:
   a. "Patch #145 Vinyl – Rubber Adhesive," 3M, St. Paul, MN.
   b. "Polyken, Type 826," Kendall Co., Boston, MA.
   c. "PWT-20," Alltape, Hialeah, FL.
   d. Approved Equivalent.
2. Approved repair tape used in plant and field on only those tendons with damage less than the maximum allowed to be repaired by this specification. Duct tape is not approved.

2.5 CONCRETE MATERIALS AND MIX DESIGN

A. Concrete Materials: As specified in Section 03 31 00 – Structural Concrete.

B. Mix Design: As specified in Section 03 31 00 – Structural Concrete.

C. Mix Design Requirements and Limitations and Proportioning Methods: As specified in Section 03 31 00 – Structural Concrete.

2.6 GROUT

A. Grout Fill at Tendon Cut-Off:
1. Compressive Strength (28 day): 4000 psi.
2. Color to match adjacent concrete.
3. Mock up to be provided by Contractor and approved by Engineer.

2.7 SOURCE QUALITY CONTROL AND TESTS

A. Division 01 – General Requirements: Testing, inspection and analysis requirements.

B. Inspect stressing tendons before delivery to site for compliance with specified standards.

C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Verify that site conditions are ready to receive Work and field measurements are as indicated on shop drawings.

3.2 FORMWORK ERECTION

A. Construct and support formwork in accordance with Section 03 31 00 – Structural Concrete.

B. Provide supports and working space for tensioning jacks.

C. Provide permanent tendon location markers.

D. Install anchorage and connection devices.

E. Install reglets.

3.3 REINFORCEMENT PLACEMENT

A. Tendon Placement:
1. Supports for tendons shall be such as to provide the parabolic tendon profiles (unless noted otherwise) indicated on drawings and to insure their remaining in position prior to and during placing of concrete. Locate supports for tendons at the high and low points of tendon profile, at 4'-0" maximum O.C., and at other locations as shown on drawings. Support chairs and slab bolsters shall be attached to form surface by staples or other acceptable devices.
2. All prestressing steel tendons shall be clean and free of corrosion or injurious marks. Tendons shall have no sharp kinks. Provide adequate protection for exposed prestressing strand at tendon ends to prevent corrosion.
3. Broken strands and strands showing severe fabrication defects shall be removed and replaced, or the member may be rejected.
4. All prestressing steel within every group of same type of members should be of same heat, wherever practicable. All steel shall be assigned a heat number and tagged accordingly.
5. Welding of support bars or any welding in vicinity of tendons is not permitted, nor shall tendons or anchorages be used as a ground for any welding.

B. Maximum Variation from Indicated Position: 1/8 inch.

C. Maximum Variation from Indicated Elevation: 1/8 inch.

D. Stressing Anchorages:
1. Stressing anchorages shall be installed perpendicular to tendon axis. Point of tangency to tendon profile curvature shall preferably not be closer than 3 ft. from stressing anchorage.
2. Stressing anchorages shall be attached to bulkhead forms by either bolts, nails, or threaded pocket former fittings. Connections shall be sufficiently rigid to avoid accidental loosening due to construction traffic or during concrete placement.

E. Intermediate Anchorages: Intermediate anchorages shall be installed embedded in concrete with the same tolerances required for stressing anchorages.

F. Fixed Anchorages:
1. Fixed anchorages shall be installed on tendon at supplier's plant prior to shipment to the job site.

2. For wedge type anchorages, fixed end wedges shall be seated with a load not more than 80 percent of minimum ultimate tensile strength of tendon. The seating load shall be sufficient to ensure adequate capacity of non-stressing anchorages.
3. Fixed end anchorages shall be placed in the formwork at locations shown on placement drawings, and securely fastened to reinforcing steel. Minimum tolerances required for stressing anchors apply to fixed end anchorages.
4. Fixed end anchorage shall be closed or capped at the wedge cavity side with a watertight cover. This cover should be preferably shop installed after filling void around the wedge grips with corrosion preventive coating material, compatible to that used as a corrosion preventive coating over length of the tendon.

G. Inserts and Fastening Devices for Other Work: Inserts may be used only in areas where there will be no interference with post-tensioning tendons and/or anchorages. In no case may embedded items be attached to post-tensioning steel, and care shall be taken so as not to have tendons out of their designed positions. Powder-driven or drilled-in inserts will not be permitted, unless otherwise approved in writing by the Structural Engineer. At a minimum, post-tensioning tendons need to be located prior to drilling in post-tensioned concrete slabs, beams, or girders.

H. Any damage to shop assembled tendon encapsulating system, such as sheathing tears or cuts (beyond that specified as repairable), sheathing withdrawn from connecting sleeves withdrawn from dead end anchorages shall be cause for rejection by Contractor, Structural Engineer or Testing Agency's inspector.

I. All damaged tendon sheathing shall be repaired to satisfaction of the Testing Agency's inspector to prevent moisture intrusion prior to concrete placement around sheathing. Repairs shall restore the corrosion inhibiting coating and be made with high density polyethylene tape spirally or longitudinally wrapped around the tendon for a minimum of 6 inches beyond damage of splice so as to completely seal damaged area, and to provide a double thickness of tape at all points.

J. All elements of the encapsulated system, including those assembled in the field, shall be filled with corrosion inhibitive coating. This includes wedge cavities in anchorages, sheathing connecting sleeves and trumpets, as well as stressing and dead end caps. Spot checks will be required by the Testing Agency's inspector to ensure that no significant air void remains in the system and strand is completely covered with the coating.

K. No tensioning will be permitted unless post-tensioning tendons are reasonably free and unbonded in the enclosure. Tie wires shall not be tightened to the extent that tendon sheath is cut or damage during installation or tendon stressing.

3.4 INSTALLING CONCRETE

A. Place concrete in accordance with Section 03 31 00 – Structural Concrete.

B. Verify tendons, duct, conduit, anchors, seats, plates, and other items to be cast into concrete are placed and secure.

C. Refer to Section 03 31 00 – Structural Concrete for curing requirements.

3.5 TENSIONING

A. Begin tensioning operations after concrete has reached 3750 psi compressive strength and ambient temperature is above specified requirements. Confirm concrete strength with test cylinders prior to tensioning.

B. Perform tensioning in one steps. Measure prestressing force. Maintain jacking and tensioning records as work progresses.

C. Jack against tendon pressure plate, not against concrete.

D. Cut off excess tendon inside face of concrete. Apply touch-up primer to cut end.

E. Repair members damaged during tensioning process.

F. Acceptance Tests
1. Prestressing will be deemed acceptable if total elongation for all tendons in the same direction of an element is between 93 percent and 107 percent of total calculated elongation of tendons, and each individual measured elongation is between 93 percent and 107 percent of its calculated value. An element is defined as all of the tendons in one bay of the system.
2. If measured elongations deviate from calculated elongations by more than specified limits, additional testing, re-stressing, strengthening, or replacement of affected elements may be required at the discretion of Architect. The cost of any remedial work required shall be born by Contractor.

3.6 GROUTING

A. Grout fill anchorage pockets.

3.7 REMOVAL OF FORMS

A. 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.

3.8 REPAIR OF SURFACE DEFECTS

A. Repair surface defects in accordance with Section 03 31 00 – Structural Concrete.

B. Request examination of concrete surfaces upon removal of forms.

C. Replace concrete not conforming to required lines, detail, and elevations.

D. Replace concrete not properly placed, resulting in honeycombing or other defects.

3.9 CONCRETE TOLERANCES

A. Division 01 – General Requirements: Tolerances.

B. Conform to Section 03 31 00 – Structural Concrete for formwork construction tolerances.

C. Conform to Section 03 31 00 – Structural Concrete for reinforcement construction tolerances.

D. Conform to Section 03 31 00 – Structural Concrete for floor flatness tolerance requirements.

3.10 FIELD QUALITY CONTROL

A. Division 01 – General Requirements: Field inspecting, testing, adjusting, and balancing.

B. Field inspection and testing will be performed by Owner's testing laboratory in accordance with ACI 318.

C. Concrete Inspections:
1. Continuous Tensioning Inspection: Inspect for application of proper tension on tendons by measuring steel elongation and jacking force. Inspect anchor seating.
2. Continuous Grouting Inspection: Inspect grout placement for bonded tendons.
3. Other Inspections: As specified in Section 03 31 00 – Structural Concrete.

D. Strength Test Samples:
1. Concrete Sampling, Cylinder Molding, and Curing Procedures: As specified in Section 03 30 00.
2. Grout Cube Molding, Curing, and Testing Procedures: ASTM C109.
3. Sample concrete and make one set of four cylinders for every 75 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.
4. Make one additional cylinder during cold weather concreting, and field cure.
5. Monitor maturity meters for strength gain prior to tendon stressing.

E. Field Testing:
1. Test Methods and Tests: As specified in Section 03 31 00 – Structural Concrete.

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SECTION 03 41 13

PRECAST CONCRETE HOLLOW CORE PLANKS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Tunnel Roof planks.
2. Connection plates.
3. Grouting plank joint keys.

B. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern all work under this Section.
2. Section 03 31 00 - Structural Concrete: Concrete.
3. Section 03 45 00 – Precast Architectural Concrete.

1.2 REFERENCES

A. American Concrete Institute (ACI):
1. ACI 301 - Specifications for Structural Concrete.
2. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International (ASTM):
1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
3. ASTM A416 - Standard Specification for Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.
4. ASTM A615 - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
5. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
6. ASTM A706 - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

C. American Welding Society (AWS):
1. AWS B2.1 - Specification for Welding Procedure and Performance Qualification.
2. AWS D1.1 - Structural Welding Code - Steel.
3. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

D. Precast/Prestressed Concrete Institute (PCI):

1. PCI MNL-116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products.
2. PCI MNL-120 - PCI Design Handbook - Precast and Prestressed Concrete.
3. PCI MNL-123 - Design and Typical Details of Connections for Precast and Prestressed Concrete.
4. PCI MNL-124 - Design for Fire Resistance of Precast Prestressed Concrete.
5. PCI MNL-126 - PCI Manual for the Design of Hollow-Core Slabs.

E. Underwriters Laboratories Inc. (UL):
1. UL - Fire Resistance Directory.

1.3 DESIGN REQUIREMENTS

A. Design components to withstand dead loads and live loads in restrained condition:
1. Loads as indicated on Drawings.

B. Maximum Plank Width: 30”.

C. Maximum Plank Weight: 4250 lbs.

D. Maximum Allowable Deflection of Planks: 1/240 span.

E. Design components to accommodate construction tolerances, deflection of other building structural members, and clearances of intended openings.

F. Grouted Keys: Capable of transmitting horizontal shear force of 2,000 lb/ft.

1.4 SUBMITTALS

A. Division 01 – General Requirements: Submittal procedures.

B. Shop Drawings: Indicate plank layout, connection details, edge conditions, bearing requirements, support conditions, dimensions, openings, openings intended to be field cut, and relationship to adjacent materials.

C. Product Data: Indicate standard component configuration, design loads, deflections, and cambers fire ratings.

D. Design Data: Indicate calculations for loadings and stresses of planks; signed and sealed by Professional Engineer.

E. Fabricator's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention.

1.5 SUSTAINABLE DESIGN SUBMITTALS

A. Division 01 – General 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.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
   1. Provide cost data for the following products:
      a. Products with recycled material content.
      b. Regional products.

1.6 QUALITY ASSURANCE

A. Design planks in accordance with requirements of:
   1. PCI MNL-120 - Design Handbook.
   2. PCI MNL-126 - Manual for the Design of Hollow Core Slabs.
   3. PCI MNL-124 - Design for Fire Resistance of Precast Prestressed Concrete.
   4. ACI 318.
   5. ACI 301.

B. Design connections in accordance with PCI MNL-123 - Manual on Design of Connections for Precast Prestressed Concrete.

C. 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.

D. Fire Rated Construction: 2 hour rating.
   1. Tested Rating: Determined in accordance with ASTM E119.

E. Surface Burning Characteristics:
   1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
   2. Other Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

F. Apply label from agency approved by authority having jurisdiction to identify each foam plastic insulation board.

1.7 QUALIFICATIONS

A. Fabricator: Company specializing in manufacturing Work of this section with five (5) years documented experience.

B. Welder: Qualified within previous 12 months in accordance with AWS B2.1.

C. Design planks under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Wisconsin.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Division 01 – General Requirements: Product storage and handling requirements.

B. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.

C. Mark each member with date of production and final position in structure.

1.9 COORDINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Coordinate with framing components directly associated with the Work of this Section.

C. Coordinate field cut openings with affected section.

D. Coordinate location of hanger tabs and devices for mechanical and electrical work.

PART 2 - PRODUCTS

2.1 SUSTAINABILITY CHARACTERISTICS

A. Division 01 – General Requirements: Requirements for sustainable design compliance.

B. 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.

2.2 MATERIALS

A. Concrete Materials: ACI 301.

B. Tensioning Steel Tendons: ASTM A416 Grade 270, of diameter appropriate to member design.

C. Deformed Reinforcement: ASTM A615 Grade 60, 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.

2.3 ACCESSORIES

A. Connecting and Supporting Devices: Plates, angles, items cast into concrete and inserts: ASTM A36 carbon steel; hot dip galvanized in accordance with ASTM A153.

B. Core Hole End Plugs: Cement Grout.

C. Hanger Tabs: Galvanized steel, designed to fit into grouted key joints, capable of supporting 500 lbs dead load, predrilled to receive hanger. Locate at end key joint, centered in the tunnel width.

D. Bearing Pads: High density plastic, 1/8 inch thick, smooth on both sides.

E. Sill Seal: Compressible glass fiber strips.

2.4 FABRICATION

A. Planks: Plant cast, prestressed, hollow core; fabricated in accordance with PCI MNL-126.

B. Nominal thickness: 8 inches; nominal width: 24 inches.

C. Weld reinforcing in accordance with AWS D1.4.

D. Embed anchors, inserts, plates, angles, and other items at locations indicated.

E. Fabricate openings required by other sections, at locations indicated.

F. Provide weep holes to drain any water from cores.

G. Cut exposed ends flush.

H. Plant Finish: Finish members to PCI MNL-116 Standard Grade.

I. Connecting and Supporting Steel Devices: Do not paint surfaces in contact with concrete or surfaces requiring field welding.

2.5 FABRICATION TOLERANCES

A. Tolerances: Conform to PCI MNL-126.

2.6 SOURCE QUALITY CONTROL AND TESTS

A. Division 01 – General Requirements: Testing, inspection and analysis requirements.

B. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
   1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Verify site conditions are ready to receive Work and field measurements are as indicated on shop drawings.

C. Verify supporting structure is ready to receive work.

3.2 PREPARATION

A. Prepare support devices for erection procedure and temporary bracing.

3.3 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 connections are made. Protect members from staining.

D. Install bearing pads and sill seal at bearing ends of planks.

E. Adjust differential camber between precast members to tolerance before final attachment and grouting.

F. Adjust differential elevation between precast members to tolerance before final attachment.

G. Install hanger tabs in joints at 24 inches oc.

H. Secure units in place. Perform welding in accordance with AWS D1.1.

I. Tape seal underside of plank joints to prevent grout leakage.

J. Grout longitudinal keys as indicated on Drawings.

K. Make plank-to-plank joints smooth using grout, troweled smooth. Transition differential elevation of adjoining planks with grout to maximum slope of 1 in 12.

3.4 ERECTION TOLERANCES

A. Division 01 – General Requirements: Tolerances.

B. Erect members level and plumb within allowable tolerances. Conform to PCI MNL-126.

3.5 FIELD QUALITY CONTROL

A. Welding: Inspect welds in accordance with AWS D1.1.

3.6 CLEANING

A. Division 01 – General Requirements: Final cleaning.

B. Clean weld marks, dirt, and blemishes from surface of exposed members.

3.7 PROTECTION OF INSTALLED CONSTRUCTION

A. Division 01 – General Requirements: Protecting installed construction.

B. Protect members from damage caused by field welding or erection operations.

C. Use non-combustible shields during welding operations to protect adjacent Work.

END OF SECTION

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SECTION 03 45 00

PRECAST ARCHITECTURAL CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Architectural precast concrete wall panels and parapet caps.

B. Architectural precast concrete accessories.

C. Supports, anchors, and attachments.

1.2 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-formed Metal Framing.

B. Section 07 21 00 - Thermal Insulation: Continuous insulation.

C. Section 07 92 00 - Joint Sealants: Sealing perimeter and intermediate joints.

D. Section 14 91 85 - Snow Chute

1.3 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week prior to commencing work of this section.

1.4 SUBMITTALS

A. Product Data: Manufacturer's information on accessory products, including pigments, admixtures, inserts, plates, etc.

B. Shop Drawings: Indicate layout, unit locations, configuration, unit identification marks, reinforcement, 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, stamped and sealed by a Structural Engineer licensed in the State of Wisconsin.

C. Samples: Submit two cast pieces, 12 by 12 inch in size, illustrating surface finish, color and texture.

D. Fabricator's Qualification Statement: Provide documentation showing precast concrete fabricator is accredited under IAS AC157.

1.5 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 of Wisconsin.

B. Welder Qualifications: Qualified within previous 12 months in accordance with AWS D1.1/D1.1M and AWS D1.4/D1.4M.

1.6 MOCK-UP

A. Provide panel mock-up, 8 feet long by 4 feet wide, with lifting device, and attachment points, and finish in accordance with approved sample.

B. Locate where directed.

C. Coordinate with Section 01 43 43 – Mock Ups.

1.7 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.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Architectural Precast Concrete:

1. Wells Concrete: www.wellsconcrete.com
2. Gage Brothers: www.gagebrothers.com
3. International Concrete Products: www.internationalconcrete.com
4. Spancrete: www.spancrete.com
5. Others as approved.

2.2 PRECAST UNITS

A. Precast Architectural Concrete Units: Comply with PCI MNL-120, PCI MNL-122, PCI MNL-123, PCI MNL-135, and ACI 318.

1. Design Loads: Static loads, anticipated dynamic loading, including positive and negative wind loads, thermal movement loads, and erection forces as defined by applicable code.
2. Calculate structural properties of units in accordance with ACI 318.
3. Accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
4. Provide connections that accommodate building movement and thermal movement and adjust to misalignment of structure without unit distortion or damage.

B. Form Finish: Smooth, Light Acid Etch.

C. Color: Match Architect's sample.

2.3 REINFORCEMENT

A. Type 316 stainless steel pre-stressing tendons: ASTM A492, ASTM A240 and Federal Standard RR-W-410D.

2.4 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

1. Federal White Cement.

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.
1. Coarse Aggregate: 1/2 inch Fort Dodge.
2. Fine Aggregate:
a. Fister Quarries; Waukesha Mfg. Sand
b. Fister Quarries; Platte River No. 10 Sand

D. Lightweight Structural Aggregate: ASTM C330/C330M.

E. Water: Clean and not detrimental to concrete.

F. Air Entrainment Admixture: ASTM C260/C260M.

G. Grout:
1. Non-shrink, non-metallic, minimum 10,000 psi, 28 day strength.

H. Concrete Mix Design:
1. Basis of Design: Wells Concrete, Sample #AA537E.

2.5 SUPPORT DEVICES

A. Embeds: Type 316 stainless steel: ASTM A240.

B. Brackets: Hot dipped galvanized, ASTM A123 Grade 100 or ASTM A653 G210.

C. Fasteners: Elco Industries Drill Flex or Elco Industries Bi-Flex Stainless Steel.

D. Non-adjusting Clip System: Fasten to steel studs as indicated on approved shop drawings.

E. Primer: Zinc rich type.

2.6 ACCESSORIES

A. Bearing Pads: High density plastic; 1/8 inch thick, smooth both sides.
1. Compressive Strength: 4500 psi.
2. Korolath or equal.

B. Reglets: Specified in Section 07 62 00.

2.7 FABRICATION

A. Fabricate in conformance with PCI MNL-117 and PCI MNL-135.

B. Maintain plant records and quality control program during production of precast units. Make records available upon request.

C. Maintain consistent quality during manufacture.

D. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

E. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.

F. Place recessed flashing reglets continuous and straight.

G. Locate hoisting devices to permit removal after erection.

H. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

I. Minor patching in plant is acceptable, providing structural adequacy and appearance of units is not impaired.

2.8 FABRICATION TOLERANCES

A. Conform to PCI MNL-117 and PCI MNL-135, except as specifically amended below.

1. Maximum Variation From Nominal Face Dimensions: Plus or minus 3/32 in.
2. Maximum Variation From Square or Designated Skew: Plus or minus 1/8 inch in 10 feet.
3. Maximum Variation from Thickness: Plus or minus 1/8 in.
4. Maximum Misalignment of Anchors, Inserts, Openings: Plus or minus 1/8 inch.
5. Maximum Bowing of Members: Plus or minus length/360.

2.9 SOURCE QUALITY CONTROL

A. Provide testing and analysis of concrete mix.

B. Field Welds shall be subject to visual inspections and non-destructive testing to ASTM E165 or ASTM E709.

PART 3 EXECUTION

3.1 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.2 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. Touch-up field welds and scratched or damaged primed painted or galvanized surfaces.

E. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers.

F. Exposed Joint Dimension: 1/2 inch. Adjust units so that joint dimensions are within tolerances.

3.3 TOLERANCES

A. Erect members level and plumb within allowable tolerances. Conform to PCI MNL-135, except as specifically amended below.

1. Plan Location from Building Grid Datum: Plus or minus 3/8 in.
2. Top Elevation from Nominal Top Elevation: Plus or minus 3/8 inch.
3. Maximum Plumb Variation Over Height of Structure or 100 ft (whichever is less): Plus or minus 1/2 inch.
4. Exposed Joint Dimension: Plus or minus 3/16 inch.
5. Maximum Jog in Alignment of Matching Faces or Edges: Plus or minus 3/16 inch.
6. Differential Bowing or Camber as Erected Between Similar Adjacent Members: Plus or minus 3/16 inch.

END OF SECTION

SECTION 04 20 00

UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete Block.

B. Clay Facing Brick.

C. Mortar and Grout.

D. Reinforcement and Anchorage.

E. Flashings.

F. Accessories.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all relevant installers.

1.3 SUBMITTALS

A. Product Data: Provide data for masonry units, reinforcing steel bars, fabricated wire reinforcement, mortar, and masonry accessories.

B. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.4 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/530.1/ERTA, except where exceeded by requirements of the contract documents.

1.5 MOCK-UP

A. See integrated exterior mock up under Section 01 43 43 Mock-Ups.

1.6 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

2.1 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:

1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.

2. Special Shapes: Provide U-block bond beam lintels, corners, jambs, sash, control joint headers, bonding, starter blocks, and other special conditions.

3. Load-Bearing Units: ASTM C90, normal weight.

2.2 BRICK UNITS

A. Facing Brick: ASTM C216, Type FBS, Grade SW.

1. Color and texture:

a. Face Brick: Endicott Clay Products Co; Manganese Ironspot, Velour Modular.

2. Size: Norman, 2 1/4 inch x 3 5/8 inch x 11 5/8 inch.

3. Special shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.3 MORTARAND GROUT AND GROUT MATERIALS

A. Masonry Cement: ASTM C91/C91M, Type S.

1. Colored Mortar: Premixed cement as required to match Architect's color sample.

2. Manufacturers:

a. Holcim (US) Inc; Mortamix Rainbow Custom Color Mortar Cement

b. Lafarge NA; Custom Color Masonry

B. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.

C. Hydrated Lime: ASTM C207, Type S.

D. Mortar Aggregate: ASTM C144.

E. Water: Clean and potable.

2.4 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:

1. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com

2. WIRE-BOND: www.wirebond.com

B. Single Wythe Joint Reinforcement: Truss or ladder type; ASTM A1064/A1064M steel wire, mill galvanized to ASTM A641/A641M, Class 3; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

C. Strap Anchors: Bent steel shapes configured as required for specific situations, 1-1/4 in width, 0.105 in thick, lengths as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face, corrugated for embedment in masonry joint, hot dip galvanized to ASTM A 153/A 153M, Class B.

D. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.

E. 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; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.

2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.

3. Vertical adjustment: Not less than 3-1/2 inches.

F. Reinforcing Steel: ASTM A615, 60 ksi yield grade, deformed, epoxy coated at parking, uncoated at commercial.

2.5 FLASHINGS

A. Rubberized Asphalt Flashing: Self-adhering polymer modified asphalt sheet; 40 mils (0.040 inch) minimum total thickness; with cross laminated polyethylene top and bottom surfaces.
   1. Manufacturers:
      a. York Manufacturing, Inc; York Seal: www.yorkmfg.com
      b. Hohmann & Barnard, Inc; Textroflash Flashing: www.h-b.com
      c. Wire-Bond; Aqua Flash 500: www.wirebond.com

B. Drip Plate: Stainless Steel Type 304, ASTM A240, ASTM A666, ASTM A480 and ASTM A167. Provide manufacturer's mastic/sealant for installation of drip plate.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc; DP - Standard Drip Plate: www.h-b.com
      b. Wire-Bond; #4165 Drip Edge Flashing: www.wirebond.com

C. Factory-Fabricated Flashing Corners and Ends: Stainless steel corners and end dams.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc; Stainless Steel Corners and End Dams: www.h-b.com
      b. Wire-Bond; Corners & End Dams (Stainless Steel): www.wirebond.com

D. Termination Bar: Stainless Steel Type 304. 1/8 inch thick x 1 inch wide x 8 foot long with 1/4 inch diameter holes at 8 inches on center. Seal with manufacturer's recommended mastic.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc
      b. Wire-Bond

E. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

2.6 ACCESSORIES

A. Preformed Control Joints: Rubber or neoprene material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Hohmann & Barnard, Inc (including Dur-O-Wal brand): www.h-b.com
      b. WIRE-BOND: www.wirebond.com

B. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
      a. Manufacturers:
         1) Advanced Building Products Inc; Mortar Maze 315: www.advancedflashing.com.
         2) Sandell Construction Solutions; Mortar Web: www.h-b.com.

C. Building Paper: ASTM D226/D226M, Type I ("No.15") asphalt felt.

D. Termination Bars: Stainless steel; compatible with membrane and adhesives.

E. Weeps and Cavity Vents: Polyethylene tubing.

1. Manufacturers:

a. Hohmann & Barnard, Inc; Quadro-Vent: www.h-b.com

b. WIRE-BOND; Cell Vent: www.wirebond.com

F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.7 MORTAR AND GROUT MIXES

A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.

1. Masonry below grade and in contact with earth: Type M.

2. Exterior, loadbearing masonry: Type S.

3. Exterior, non-loadbearing masonry: Type S.

4. Interior, loadbearing masonry: Type S.

5. Interior, non-loadbearing masonry: Type O.

B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

C. Mixing: Use mechanical batch mixer and comply with referenced standards.

PART 3 EXECUTION

3.1 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.2 COLD AND HOT WEATHER REQUIREMENTS

A. Comply with requirements of ACI 530/530.1/ERTA or applicable building code, whichever is more stringent.

3.3 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.

3.4 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. Remove excess mortar and mortar smears as work progresses.

D. Interlock intersections and external corners, except for units laid in stack bond.

E. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

F. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

G. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.5 WEEPS/CAVITY VENTS

A. Install weeps in veneer and cavity walls at 24 inches on center horizontally above 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.

3.6 CAVITY MORTAR CONTROL

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. 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.

3.7 REINFORCEMENT AND ANCHORAGE - GENERAL

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. Lap joint reinforcement ends minimum 6 inches.

D. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

3.8 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY

A. 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. Lap joint reinforcement ends minimum 6 inches.

3.9 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. 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. Lap joint reinforcement ends minimum 6 inches.

D. 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 into adjacent masonry or turn up at least 8 inches to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.
   4. Provide termination bar at top of through wall flashings. Embed termination bar in manufacturer's recommended mastic/sealant and fasten to stud back up at 16 inches on center. Seal top edge of termination bar with sealant recommended by manufacturer.
   5. Hold through wall flashing, 1/2 inch from face of brick and terminate onto drip edge. Lay drip edge in continuous bead of mastic/sealant.
   6. Provide prefabricated inside and outside corners and end dams. Place and provide through wall flashing over prefabricated corners and end dams.
B. Lap end joints of flashings at least 6 inches and seal watertight with flashing sealant/adhesive.

3.11 LINTELS

A. Install loose steel lintels over openings where indicated.
B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
   1. See Lintel Schedule on Structural Drawings, Schedule and Schedule Details Sheet.

3.12 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. Construct control joints in above-grade masonry where indicated on the Drawings. Do not construct control joints below grade. If not indicated:
   1. Locate exterior vertical control joints at 20 feet on center, maximum. Locate interior vertical control joints at 30 feet on center, maximum. Provide vertical control joints at one side of each lintel, and 4 feet maximum from each corner.
   2. Locate exterior horizontal control joints at 20 feet on center, maximum, with soft joints at each shelf angle at top of wall.
D. Form control joints in concrete masonry units with a sheet building paper bond breaker, fitted to one side of the hollow contour end units. Fill the resultant elliptical core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.
E. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

3.13 BUILT-IN WORK

A. As work progresses, install built-in metal door 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.

3.14 TOLERANCES

A. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

B. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

3.15 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 01 40 00.

3.16 CLEANING

A. Remove excess mortar and mortar droppings.

B. Clean soiled surfaces with cleaning solution.

END OF SECTION

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SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fabrication, transportation, delivery, and erection of structural steel.
2. Structural steel, framing members, support members, struts, bracing, welds, and fasteners.
3. Base plates, anchor rods, bearing plates, anchors, shear stud connectors.
4. Inserts for steel work.

B. Products Supplied But Not Installed Under This Section:
1. Section 03 31 00 – Structural Concrete: Non-shrink grout under base plates.
2. Division 04 – Masonry: Anchors for embedding into masonry.

C. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern all work under this Section.
2. Section 03 41 13 – Precast Concrete Hollow Core Plank: Precast concrete anchorage devices for attachment to structural steel.
3. Section 05 31 23 - Steel Roof Decking: Support framing for small openings in roof deck.
4. Section 05 50 00 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.2 REFERENCES

A. ASTM International (ASTM):
1. ASTM A36 - Standard Specification for Carbon Structural Steel.
2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
6. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
7. ASTM A500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
8. ASTM A563 – Standard Specification for Carbons and Alloy Steel Nuts.
9. ASTM A673 – Standard Specification for Sampling Procedure for Impact Testing of Structural Steel.
10. ASTM A992 - Standard Specification for Structural Steel Shapes.
11. ASTM F436 – Standard Specification for Hardened Steel Washers.
12. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

B. American Welding Society (AWS):
   1. AWS A2.0 - Standard Welding Symbols.
   2. AWS D1.1 - Structural Welding Code.

C. American Institute of Steel Construction, Inc (AISC):
   1. AISC – Steel Construction Manual, Current Edition.
   2. AISC - Code of Standard Practice for Steel Buildings and Bridges.
   3. AISC - Specification for Architectural Exposed Structural Steel.

D. Research Council on Structural Connections (RCSC):
   1. RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts.

E. The Society for Protective Coatings (SSPC):
   1. Volume 1 – Good Painting Practices, Current Edition.
   2. Volume 2 – Systems and Specifications.

1.3 SUBMITTALS

A. Division 01 – General Requirements: Submittal Procedures.

B. Shop and Erection Drawings:
   1. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, and fasteners.

C. Show all connections.
   1. Indicate welded connections with AWS A2.0 welding symbols. Indicate net weld lengths.
   2. Indicate cleaning and painting specifications.
   3. Assume responsibility for dimensional errors.
   4. Field verify dimensions affected by existing construction prior to submitting Shop Drawings and so note verified dimensions on shop drawings.
   5. Field verify existing anchor bolt placements and modify base plates to accommodate field conditions.
   6. Fabricator shall check shop drawings before Submittal.
   7. Provide holes for installation of other work.
   8. Any omission from shop drawings of any materials required by Contract Documents shall not relieve Contractor of responsibility of furnishing and installing such materials, even though shop drawings may have been reviewed and approved.

1.4 SUSTAINABLE DESIGN SUBMITTALS

A. Division 01 – General 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 source and origin for salvaged and reused products.
      b. Certify recycled material content for recycled content products.
      c. Certify source for local and regional materials and distance from Project site.
   2. Indoor Air Quality Certificates:
      a. Certify volatile organic compound content for each interior paint and coating.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
   1. Provide cost data for the following products:
      a. Salvaged products.
      b. Reused products.
      c. Products with recycled material content.
      d. Local and regional products.

1.5 QUALITY ASSURANCE

A. Fabricate structural steel members in accordance with AISC -Specifications and the AISC Code of Standard Practice for Steel Buildings and Bridges.

B. Sustainable Design Requirements:
   1. Recycled Content Materials: Furnish materials with recycled content.
   2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as shown on Drawings and shop drawings.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Structural Steel W-Shape and WT-Shape Members: ASTM A992, Fy = 50 ksi.

B. Structural Steel Angles, Plates, Channels and Other Rolled Members: ASTM A36, Fy = 36 ksi.

C. Rectangular or Square (HSS) Hollow Structural Sections: ASTM A500, Grade B, Fy = 46 ksi.

D. Round (HSS) Hollow Structural Sections: ASTM A500, Grade B, Fy = 42 ksi.

E. Steel Pipe: ASTM A53, Grade B, Fy = 35 ksi.

F. Shear Stud Connectors: ASTM A108 Grade 1015, Fu = 60 ksi Forged Steel, headed and uncoated.

G. Bolts, Nuts, and Washers: ASTM A325 High-Strength Bolts, Type 1 – Medium Carbon, Carbon Boron or Medium Carbon Alloy Steel finish; with ASTM A563 heavy hex nuts and ASTM F436 washers, head markings on bolts, fully traceable;
   1. Manufacturers:
      a. Nucor Fastener.
      b. St. Louis Screw & Bolt Co.
      c. Hayden Bolts.
      d. Approved equal.

H. Threaded Anchor Bolts (Anchor Rods): ASTM F1554, Class 2A threads; Grade 36; straight; headless with ASTM A563 heavy hex nuts, and ASTM F436, Type 1 washers.

I. Non-threaded Anchor Bolts (Anchor Rods): ASTM F1554; Grade 36 Grade 105; straight.

J. Welding Electrodes: E70XX and shall comply with AWS D1.1; type required for materials being welded.

K. Shop Primer: Interior steel receiving no additional Coatings: Universal Metal Primer for Structural Steel grey.

L. Shop Primer: Exposed Interior and Exterior Steel Receiving Additional Coatings: Primer shall be Universal Metal Primer for Structural Steel compatible with subsequent finish coats specified in Section 09 90 00 – Painting and Coating.

M. Drilled anchors shall be Kwik Bolt TZ as manufactured by Hilti.

2.2 FABRICATION

A. Fabricate items of structural steel in accordance with AISC specifications, and as shown on approved shop drawings.

B. Field connections are to be bolted unless welded, or other types of connections are indicated.

C. Bolted connections shall be made with ASTM A325 high strength bolts, unless otherwise noted.

D. Connections shall be made with standard double angles unless otherwise shown.

E. Install high strength threaded fasteners in accordance with RCSC - “Specifications for Structural Joints Using ASTM A325 or A490 bolts”.

F. Welding shall comply with AISC and AWS Codes for procedures, appearance, quality of welds, and for methods used in correcting welding work.

G. All welds shall be made by AWS pre-qualified welders, certified for welds made.

H. Minimum size of fillet welds shall be as specified in TABLE J2.4 of AISC Manual of Steel Construction.

I. Provide holes required for securing other work to structural steel framing and for passage of other work through steel members, as shown on approved shop drawings.

J. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

K. Verify or supplement dimensions shown on Drawings by field measurements to assure fit of new work.

L. Jointed members shall be sealed with continuous welds unless otherwise noted.

M. Struts and Braces:
1. Connections for all struts, hangers, and braces shall have connection designed to develop full allowable tensile strength of member unless design force is indicated on drawings.

2.3 FINISH

A. Galvanize structural steel members to ASTM A123.

B. Provide minimum 2.0 oz/sq ft, (3.4 mils) galvanized coating for members 3/16-inch to 1/4-inch thick, and 2.3 oz/sq ft, (3.9 mils) for members greater than or equal to 1/4-inch.

PART 3 - EXECUTION

3.1 PREPARATION

A. Verify that field conditions are acceptable and are ready to receive work in accordance with Drawings and shop drawings.

B. Verify anchors and anchor rods have been preset into connection work in accordance with Drawings and shop drawings.

C. Beginning of installation and erection means that existing conditions have been checked and found acceptable.

D. Cost of corrections shall be borne by this Section if variances are not identified prior to start of installation.

3.2 ERECTION

A. Erect structural steel in accordance with AISC Specifications.

B. Store steel on site on substantial shores or blocking to keep free of ground and to prevent bending, buckling, or twisting.

C. Prevent water collection on members.

D. Provide for erection loads, wind, and dead loads, and provide sufficient temporary bracing to maintain structure in safe, plumb, and true alignment until completion of erection and installation of permanent bracing.

E. Do no final bolting or welding until structure has been properly aligned and plumbed.

F. Do not field cut or alter structural members without prior approval of Professional Engineer of Record.

G. Field weld components indicated on Drawings and shop drawings.

H. All bolted joints may be installed as Snug Tightened joints as specified and permitted in the RCSC - Specification, unless otherwise noted.

I. Pretension all high strength bolts for Pretension or Slip-Critical (S.C.) Joints to minimum bolt pretension specified in Table 8.1 of RCSC - Specification for Structural Joints Using ASTM A325 or A490 Bolts, Current Edition.

J. Clean and prime welds, bolt and rivet heads, abrasions of prime coat, and surfaces not previously galvanized, except surfaces to be in contact with concrete after erection.

K. Grout solid under base plates bearing plates in accordance with AISC - Code of Standard Practice for Steel Buildings and Bridges.

L. Contact surfaces of field connections shall be free from dust, oil, loose scale, burrs, pits, and other defects that prevent solid seating of parts.

M. Clean all surfaces of dirt, mud, oil, or grease that would impair bonding of fireproofing or concrete.

N. Reaming is not allowed if reaming weakens or makes it impossible to fill holes or adjust accurately after being reamed.

END OF SECTION

SECTION 05 31 23

STEEL ROOF DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Steel roof deck and accessories.
2. Formed steel closure plates and cant strips.
3. Framing for openings up to and including 18-inches.
4. Roof drain sump pans.

B. Products Furnished But Not Installed Under This Section:

C. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern all work under this Section.
2. Division 04 – Masonry: Placement of anchors for bearing plates and angles embedded in masonry.
3. Section 05 12 00 - Structural Steel Framing.
4. Division 07 – Thermal and Moisture Protection: Air Barriers.
5. Division 22 – Plumbing.

1.2 REFERENCES

A. ASTM International (ASTM):
1. ASTM A36 - Structural Steel.
2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.
4. ASTM A992 - Steel for Structural Shapes For Use in Building Framing.
5. ASTM A1008 – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

B. American Welding Society (AWS):
1. AWS D1.1 - Structural Welding Code.
2. AWS D1.3 - Structural Welding Code: Sheet Steel.

C. Steel Deck Institute (SDI):
1. SDI - Design Manual for Composite Decks, Form decks, Roof Decks, Cellular Metal Floor Deck with Electrical Distribution.

D. The Society for Protective Coatings (SSPC):

1.3 SUBMITTALS

A. Division 01 – General Requirements: Submittal requirements.

B. Shop Drawings: Indicate deck plan, support locations, projections, openings and reinforcement, pertinent details and accessories, fasteners and fastener pattern diagram.

C. Product Data: Submit deck profile characteristics and dimensions, structural properties, finishes.

D. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions.

E. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

F. Welders Certificates: Certify welders employed on Work verifying AWS qualification within previous twelve months.

1.4 SUSTAINABLE DESIGN SUBMITTALS

A. Division 01 – General 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 source and origin for salvaged and reused products.
      b. Certify recycled material content for recycled content products.
      c. Certify source for local and regional materials and distance from Project site.
   2. Indoor Air Quality Certificates:
      a. Certify volatile organic compound content for each interior paint and coating.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
   1. Provide cost data for the following products:
      a. Salvaged products.
      b. Reused products.
      c. Products with recycled material content.
      d. Local and regional products.

1.5 QUALITY ASSURANCE

A. Sustainable Design Requirements:
   1. Recycled Content Materials: Furnish materials with recycled content.
   2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing work of this Section with minimum five (5) years documented experience.

1.7 DELIVERY, STORAGE AND HANDLING

A. Division 01 – General Requirements: Product Storage and handling requirements.

B. Cut plastic wrap to encourage ventilation.

C. Site Storage: Store off ground on dry wood sleepers with one end elevated to provide positive drainage. Protect from elements with a waterproof covering, ventilated to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Epic Metals Corp.

B. United Steel Deck, Inc.

C. Vulcraft Steel Deck, Division of Nucor Corp.

D. Wheeling Corrugating Co.

E. New Millennium, LLC.

F. No Substitutions permitted.

2.2 MATERIALS

A. Sheet Steel: ASTM A653, Grade AStructural; with G90 galvanized coating.

B. Welding Materials: AWS D1.1.

C. Fasteners: Carbon steel, self-tapping screws. Framing connections - #12 minimum; deck stitch connections - #10 minimum.

D. Touch-Up Primer for Galvanized Surfaces: SSPC 20 Type I – Inorganic.

E. Framed Openings: ASTM A36 Structural Steel; Fy = 36 ksi.

2.3 ACCESSORIES

A. Flute Closures: Closed cell, one (1) inch thick; profiled to fit tight to deck.

2.4 FABRICATION

A. Metal Deck: Sheet Steel, configured as follows:
   1. Minimum Metal Thickness Excluding Finish: 18 gage.
   2. Nominal Height: 1-1/2 inch, fluted profile to SDI WR.
   3. Side Joints: Lapped.
   4. Flute Sides: plain vertical face.

B. Metal Closure Strips: 22 gage thick galvanized sheet steel; of profile and size.

C. Roof Sump Pan: Fabricate of 14 gage thick sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.

D. Cant Strips: Formed sheet steel, 20 gage, thick, 45 degree slope, 3-1/2 inch nominal width and height, galvanized with 2 inch flange for attachment.

E. Fasteners: Stainless steel, self tapping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Verify that field conditions are acceptable and are ready to receive work.

C. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Design Manual.

B. Bear deck on masonry support surfaces with four (4) inch minimum bearing. Align and level.

C. Bear deck on steel supports with 1-1/2 inch minimum bearing. Align and level.

D. Fasten deck to steel support members at ends and intermediate supports with mechanical fasteners at 12 inches on center maximum spacing. Parallel with deck flute and at each transverse flute.

E. Welded connections shall be in accordance with AWS D1.1 and D1.3.

F. Mechanically fasten male/female side laps at 24 inches on center maximum.

G. Stitch fastening of deck shall be made with minimum #10 self-tapping screws.

H. Mechanically fasten side laps, as a minimum, at mid-span for 4'-0" and 5'-0" spans and at 36 inches on center for spans over 5'-0".

I. Reinforce steel deck openings from 6 to 18 inches in size with 2-inch x 2-inch x 1/4 inch steel angles. Place angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and mechanically attach to deck at each flute.

J. Install six (6) inch minimum wide sheet steel cover plates, of same thickness as deck, where deck changes direction. Mechanically fasten 12 inches on center maximum.

K. Install sheet steel closures and angle flashing to close openings between deck and walls, columns, and openings.

L. Position roof sump pans with flange bearing on top surface of deck. Mechanically attach fasten at each deck flute.

M. Place metal cant strips in position and mechanically attach.

N. Immediately after any welding of deck and other metal components in position, clean and coat welds, burned areas, and damaged surface coating, with touch-up prime paint.

END OF SECTION

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SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Shop fabricated steel and aluminum items.

B. Fabricated ladders.

C. Vehicular Barrier Cable System (Parking ramp).

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 05 12 00 - Structural Steel Framing: Structural steel column anchor bolts.

C. Section 05 31 00 - Steel Decking: Bearing plates for metal deck bearing, including anchorage.

D. Section 05 51 00 - Metal Stairs.

E. Section 05 52 13 - Pipe and Tube Railings.

F. Section 07-7200 - Roof Accessories: Roof Hatch.

G. Section 09 90 00 - Painting and Coating: Paint finish.

H. Section 14 91 85 - Snow Chutes.

1.3 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.

B. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

PART 2 PRODUCTS

2.1 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 40, black finish.

E. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

F. Slotted Channel Fittings: ASTM A1011/A1011M.

G. Fasteners: Stainless Steel.

H. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, 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.

2.2 MATERIALS - ALUMINUM

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

B. Sheet Aluminum: ASTM B209 (ASTM B209M), 5052 alloy, H32 or H22 temper.

C. Aluminum-Alloy Drawn Seamless Tubes: ASTM B210 (ASTM B210M), 6063 alloy, T6 temper.

D. Aluminum-Alloy Bars: ASTM B211 (ASTM B211M), 6061 alloy, T6 temper.

E. Bolts, Nuts, and Washers: Stainless steel.

F. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.3 MATERIALS - STAINLESS STEEL

A. Stainless Steel: ASTM A276, Type 304.

B. Bolts, Nuts, and Washers: Stainless steel.

C. Welding Materials: AWS D1.2/D1.2M; type required for materials being welded.

2.4 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. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.5 FABRICATED ITEMS

A. Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.

1. Side Rails: 3/8 x 2 inches members spaced at 20 inches. Extend 42 inches above top surface or roof landing surface.
2. Rungs: one inch diameter solid round bar spaced 12 inches on center.
3. Space rungs 7 inches from wall surface.

B. Bollards: Steel pipe, concrete filled, crowned cap, as detailed; prime paint finish.

C. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.

D. Lintels: As detailed; galvanized 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.

2.6 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. Galvanize 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.

2.7 FINISHES - STEEL

A. Prepare surfaces to be primed in accordance with SSPC-SP2.

B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

C. Prime Painting: One coat.

D. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.

E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.8 FINISHES - ALUMINUM

A. Exterior Aluminum Surfaces: Class I color anodized.

B. Interior Aluminum Surfaces: Class I natural anodized.

C. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

D. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick; light bronze.

2.9 FINISHES - STAINLESS STEEL

A. 2B, Mill.

2.10 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

3.1 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. Provide block outs for bollards. Provide minimum 3000 psi concrete for bollard footings. Steel pipe bollards to be concrete filled (dome top) and painted.

F. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete.

3.2 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

SECTION 05 51 00

METAL STAIRS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete filled metal pan stair.

B. Structural steel stair framing and supports.

C. Handrails and guards.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete fill in stair pans.

B. Section 05 52 13 - Pipe and Tube Railings: Metal handrails and balusters other than specified in this section.

C. Section 09-9000 - Painting and Coating: Paint finish.

1.3 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Provide Design Calculations.

1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

2. Include the design engineer's stamp or seal on each sheet of shop drawings and on design calculations.

B. Welders' Certificates.

1.4 QUALITY ASSURANCE

A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State of Wisconsin.

B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.

C. Fabricator Qualifications:

1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.

PART 2 PRODUCTS

2.1 METAL STAIRS - GENERAL

A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.

1. Regulatory Requirements: Provide stairs and railings complying with the most stringent requirements of local, state, and federal regulations; where requirements of the contract documents exceed those of regulations, comply with the contract documents.

2. Handrails and Guardrails: As specified in Section 05 52 13 - Pipe and Tube Railings.

3. Structural Design: Provide complete stair and railing assemblies complying with the following:
    a. Stair Capacity: Uniform live load of 100 lb/sq ft and a concentrated load of 300 lb with deflection of stringer or landing framing not to exceed 1/360 of span.
    b. Railing Assemblies: Comply with ASTM E985.
4. Dimensions: As indicated on drawings.
5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
7. Separate dissimilar metals using paint or permanent tape.

B. Metal Jointing and Finish Quality Levels:
1. Architectural: All joints as inconspicuous as possible, whether welded or mechanical.
    a. Welded Joints: Continuously welded and ground smooth and flush.
    b. Mechanical Joints: Butted tight, flush, and hairline; concealed fastenings only.
    c. Exposed Edges and Corners: Eased to small uniform radius.
    d. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for highest quality gloss finish.
2. Commercial: Exposed joints as inconspicuous as possible, whether welded or mechanical; underside of stair not covered by soffit is considered exposed to view.
    a. Welded Joints: Intermittently welded on back side, filled with body putty, and sanded smooth and flush.
    b. Welds Exposed to View: Ground smooth and flush.
    c. Mechanical Joints: Butted tight, flush, and hairline.
    d. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts.
    e. Exposed Edges and Corners: Eased to small uniform radius.
    f. Metal Surfaces to be Painted: Sanded or ground smooth, suitable for satin or matte finish.

C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.

D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.2 METAL STAIRS WITH CONCRETE TREADS

A. Jointing and Finish Quality Level: Architectural and Commercial, as defined above.

B. Risers: Closed.

C. Treads: Metal pan with field-installed concrete fill.
1. Concrete Depth: 1-1/2 inches, minimum.
2. Tread Pan Material: Steel sheet.
3. Tread Pan Thickness: As required by design; 14 gage, 0.075 inch minimum.
4. Concrete Reinforcement: Welded wire mesh.
5. Concrete Finish: Steel troweled.

D. Risers: Same material and thickness as tread pans.
   1. Riser/Nosing Profile: Sloped riser with rounded nosing of minimum radius.
   2. Nosing Depth: Not more than 1-1/2 inch overhang.
   3. Nosing Return: Flush with top of concrete fill, not more than 1/2 inch wide.

E. Stringers: Rolled steel channels.
   1. Stringer Depth: As indicated on drawings.
   2. End Closure: Sheet steel of same thickness as risers welded across ends.

F. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
   1. Same finish as treads.

G. Finish: Shop- or factory-prime painted.

H. Under Side of Stair: Exposed to view, to be finished same as specified for other exposed to view Architectural surfaces.

2.3 HANDRAILS AND GUARDS

A. Wall-Mounted Rails: As specified in Section 05 52 13.

B. Guards: Pipe railings as specified in Section 05 52 13.

2.4 MATERIALS

A. Steel Sections: ASTM A36/A36M.

B. Steel Bar: ASTM A36 Hot Rolled Steel Bar.

C. Steel Plates: ASTM A6/A6M or ASTM A283/A283M.

D. Ungalvanized Steel Sheet: Hot- or cold-rolled, except use cold-rolled where finished work will be exposed to view.
   1. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Designation CS (commercial steel).
   2. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Designation CS (commercial steel).

E. Concrete Fill: Portland cement Type I, 4000 psi 28 day strength, 2 to 3 inch slump.

F. Concrete Reinforcement: Mesh type, unfinished.

2.5 ACCESSORIES

A. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.

B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

C. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

2.6 SHOP FINISHING

A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

B. Do not prime surfaces in direct contact with concrete or where field welding is required.

C. Prime Painting: Use specified shop- and touch-up primer.
   1. Preparation of Steel: In accordance with SSPC-SP 2, Hand Tool Cleaning.
   2. Number of Coats: One.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install components plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.

E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.

F. Obtain approval prior to site cutting or creating adjustments not scheduled.

G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.2 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION

SECTION 05 52 13

PIPE AND TUBE RAILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall mounted handrails.

B. Stair railings and guardrails.

C. Free-standing railings at steps and ramps.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 04 20 00 - Unit Masonry: Placement of anchors in masonry.

C. Section 05 51 00 - Metal Stairs.

D. Section 09 21 16 - Gypsum Board Assemblies: Placement of backing plates in stud wall construction.

1.3 SUBMITTALS

A. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1. Include the design engineer's stamp or seal on each sheet of shop drawings. Include Design calculations.

PART 2 PRODUCTS

2.1 RAILINGS - GENERAL REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

B. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935.

C. Allow for expansion and contraction of members and building movement without damage to connections or members.

D. Dimensions: See drawings for configurations and heights.

1. Top Rails and Wall Rails: 1-1/2 inches diameter, round.

2. Intermediate Rails: 1-1/2 inches diameter, round.

3. Posts: 1-1/2 inches diameter, round.

E. Provide anchors and other components 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 bolting anchors.

2. For anchorage to masonry, provide brackets to be embedded in masonry, for bolting anchors.

3. For anchorage to stud walls, provide backing plates, for bolting anchors.

4. Posts: Provide adjustable flanged brackets.

F. Provide welding fittings to join lengths, seal open ends, and conceal exposed mounting bolts and nuts, including but not limited to elbows, T-shapes, splice connectors, flanges, escutcheons, and wall brackets.

2.2 STAINLESS STEEL RAILING SYSTEM

A. Stainless Steel: Type 304.

1. Stainless Steel Bar and Plate: ASTM A666.
2. Stainless Steel Pipe: ASTM A312.
3. Cable Railing Posts: 2 inch square universal top post for surface mount.
4. Stainless Steel Cable: 5/32 inch cable.
5. Fittings: Stainless steel SNB; Anchor bolts.
6. Welding Fittings: No exposed fasteners. Fusion weld.
7. Finish: #4, non-directional finish.

2.3 STEEL RAILING SYSTEM

A. Steel Pipe: ASTM A53/A53M, Grade A Schedule 40, galvanized finish.

B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.

C. Exposed Fasteners: No exposed bolts or screws.

D. Galvanizing: In accordance with requirements of ASTM A123/A123M.

1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic.

E. Brackets: 1/4 inch formed bracket, universal saddle. Wagner Companies #1936R or equal. Provide 3/8 inch diameter hex head lag screws, cadmium plated steel, Wagner Companies #9503 or equal. Provide Lag screw expansion shields, Wagner Companies #R1151 or equal.

2.4 FABRICATION

A. Accurately form components to suit specific project conditions and for proper connection to building structure.

B. Fit and shop assemble components in largest practical sizes for delivery to site.

C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

D. Welded Joints:

1. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
3. 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.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.

C. Anchor railings securely to structure. Core drill or block out concrete to set railings as indicated on drawings. Provide non-shrink, non-expanding, non-ferrous grout.

D. Conceal anchor bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

E. Field paint galvanized steel railings per Section 09 90 00.

3.2 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.

END OF SECTION

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SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roofing nailers.

B. Preservative treated wood materials.

C. Fire retardant treated wood materials.

D. Communications and electrical room mounting boards.

E. Concealed wood blocking, nailers, and supports.

F. Miscellaneous wood nailers, furring, and grounds.

1.2 SUBMITTALS

A. Product Data: Provide technical data on wood preservative materials and application instructions.

B. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.3 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, or installation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.

2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.

B. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Lumber: S4S, No. 2 or Standard Grade.

2. Boards: Standard or No. 3.

2.3 CONSTRUCTION PANELS

A. 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.

2.4 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153.

B. Building Paper: Water resistant Kraft paper.

2.5 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA 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 AWPA standards.

B. Fire Retardant Treatment:

1. Exterior Type: AWPA U1, Category UCFB, Commodity Specification H, 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 both before and after accelerated weathering test performed in accordance with ASTM D2898.
    a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
    b. Do not use treated wood in direct contact with the ground.
2. Interior Type A: AWPA 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: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative to 0.25 lb/cu ft retention.
    a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
    b. Treat lumber exposed to weather.
    c. Treat lumber in contact with roofing, flashing, or waterproofing.
    d. Treat lumber in contact with masonry or concrete.

e. Treat lumber less than 18 inches above grade.

f. Treat lumber in other locations as indicated.

2. Preservative Pressure Treatment of Plywood Above Grade: AWPA U1, Use Category UC2 and UC3B, Commodity Specification F using waterborne preservative to 0.25 lb/cu ft retention.

a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.

b. Treat plywood in contact with roofing, flashing, or waterproofing.

c. Treat plywood in contact with masonry or concrete.

d. Treat plywood less than 18 inches above grade.

e. Treat plywood in other locations as indicated.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate installation of rough carpentry members specified in other sections.

3.2 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.

3.3 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 code authorities may be used in lieu of solid wood blocking.

C. 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.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

3.4 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

3.5 INSTALLATION OF CONSTRUCTION PANELS

A. 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.
4. Size and Location: As indicated on drawings.

END OF SECTION

SECTION 06 41 00

ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Specially fabricated cabinet units.

B. Countertops.

C. Quartz Surface material.

D. Window stools.

E. Cabinet hardware.

F. Factory finishing.

G. Preparation for installing utilities.

1.2 SUBMITTALS

A. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.

1. Minimum Scale of Detail Drawings: 1-1/2 inch to 1 foot.
2. Minimum Scale of Plans and Elevations: 1/4 inch to 1 foot.
3. Provide the information required by AWI/AWMAC/WI (AWS).

B. Product Data: Provide data for hardware accessories.

C. Samples: Submit actual samples of architectural cabinet construction, minimum 12 inches square, illustrating proposed cabinet, countertop, and shelf unit substrate and finish.

D. Samples: Submit actual sample items of proposed pulls, hinges, shelf standards, and locksets, demonstrating hardware design, quality, and finish.

E. Certification of compliance with Formaldehyde content requirements.

1.3 QUALITY ASSURANCE

A. Comply with Architectural Woodwork Standard (AWS) specifications and recommendations. Where no grade level is indicated comply with Custom Grade standards.

B. Formaldehyde content: Provide wood products that do not contain:

1. Added urea-formaldehyde.
2. Urea-formaldehyde resins.

C. Fire-Resistance Rating: Class B, per ASTM E84 and NFPA 286 as applicable.

D. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1. Company with at least five projects in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

B. Do not deliver woodwork until painting, wetwork, grinding, and similar operations in the installation area have been completed.

1.5 FIELD CONDITIONS

A. Maintain temperature above 50 degrees F, and relative humidity between 25 and 55 percent in storage areas, and in installation areas during installation and remainder of construction period.

B. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.1 CABINETS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Custom Grade.

B. Plastic Laminate Faced Cabinets: Custom grade.

2.2 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.3 LAMINATE MATERIALS

A. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

B. Provide specific types as scheduled.

1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as scheduled, finish as scheduled.
3. Cabinet Liner: CLS, 0.020 inch nominal thickness, .
4. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

2.4 COUNTERTOPS

A. Plastic Laminate: High pressure decorative laminate sheet bonded to substrate.

1. Wear Resistance: In addition to specified grade, comply with NEMA LD 3 High Wear Grade requirements for wear resistance.
2. Back and End Splashes: Same material, same construction as countertop.

B. Quartz Surface Material Countertops: Homogeneous quartz in a polyester resin binder.

1. Thickness: 3 cm nominal thickness, with 2 cm splashes.
2. Color, Pattern: As indicated in Section 09 06 01.

2.5 COUNTERTOP FABRICATION

A. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.

1. Join lengths of tops using best method recommended by manufacturer.

2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts of fixture holes.

B. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
2. Height: 4 inches, unless otherwise indicated.

C. Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

D. Wall-Mounted Counters: Provide skirts, aprons, brackets, and braces as indicated on drawings, finished to match.

2.6 ACCESSORIES

A. Adhesive: Type recommended by AWI/AWMAC to suit application.

B. Joint Sealant: Clear sealant of type recommended by manufacturer for application and use.

C. Metal Bar Stock and Trim:
1. Stainless Steel: Type 304, brushed finish.
2. Aluminum: Alloy 6063-T52, clear anodized.

D. Plastic Edge Banding: Extruded PVC, convex shaped; smooth finish; self locking serrated tongue; of width to match component thickness. Machine-applied and eased; 1.4 mm to 2.0 mm thick. Canplast Inc. or approved. Color as selected to match plastic laminate.
1. Use at all shelf edges.
2. Use at edges of doors and drawers, edges of doors and drawers, and exposed edges of cabinet bodies.

E. Glass: Tempered, as specified in Section 08 8000.

F. Fasteners: Size and type to suit application.

G. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

H. Concealed Joint Fasteners: Threaded steel.

I. Grommets: Standard plastic grommets for cut-outs, in color matte black, unless noted otherwise.
1. Doug Mockett & Company, Inc; Mockett XG3: www.mockett.com

2.7 HARDWARE

A. Hardware: BHMA A156.9, types as indicated for quality grade specified. If not indicated, as recommended by fabricator for conditions of use.

B. Adjustable Shelf Supports: Standard side-mounted system using surface mounted metal shelf standards and clips, and coordinated shelf rests, polished chrome finish, for nominal 1/2 inch spacing adjustments.
1. Product: KV 255 and 256 series manufactured by Knape & Vogt Manufacturing Company.

C. Countertop Bracket: Concealed 2 inch brackets with 24 inch support arms.

1. Load Rating: 1000 pounds per pair of brackets.
2. Product: USC -24 manufactured by A&M Hardware, Inc: www.AandMhardware.com
3. Mounting Hardware: 3/8 - 16 x 3 carriage bolt assembly.
4. Color: Black.

D. Drawer and Door Pulls: Contemporary 'U' shaped pull, zinc alloy steel with brushed satin nickel finish, 5 inch centers at casework.. Satin chrome or satin stainless steel finish.
1. Product: 128mm Pull Riva manufactured by Amerock.

E. Cabinet Locks: Keyed cylinder, two keys per lock, master keyed, steel with chrome finish.

F. Catches: Magnetic. 4 pound pull; 7 pound pull for doors over 48 inches tall.

G. Drawer Slides:
1. Type: Full extension.
2. Static Load Capacity: 100 pound rating; File drawers: 130 pound rating.
3. Mounting: Side mounted.
4. Stops: Integral type.
5. Features: Provide self closing/stay closed type.
6. Products:
   a. Knape & Vogt Manufacturing Company; KV 8400 and KV 8500: www.knapeandvogt.com

H. Hinges: European style concealed self-closing type, steel with satin finish.
1. Products:
   a. Grass America Inc; 3903 Series: www.grassusa.com

I. Clip Systems: Extruded aluminum, interlocking.
1. Products:
   a. Monarch Metal Fabrications; MF625 clip: www.monarchmetal.com

J. Coat hooks
1. Products:
   a. Bobrick; B-7671: www.bobrick.com

K. Clothes Rod
1. Products:
   a. Knape & Vogt Manufacturing Company; KV770-1CHR with 734/735 end supports.

2.8 WINDOW STOOLS

A. Material: 1/2 inch thick solid surface material, adhesively joined with inconspicuous seams; eased exposed edge detail. Color as indicated in Section 09 0601.

2.9 SHOP TREATMENT OF WOOD MATERIALS

A. Provide UL approved identification on fire retardant treated material.

B. Deliver fire retardant treated materials cut to required sizes. Minimize field cutting.

2.10 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.

C. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.

1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
2. Cap exposed plastic laminate finish edges with material of same finish and pattern.

D. Matching Wood Grain: Comply with requirements of quality standard for specified Grade and as follows:

1. Provide center matched panels at each elevation.
2. Carry figure of cabinet fronts to toe kicks.

E. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.

F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

2.11 SHOP FINISHING

A. Sand work smooth and set exposed nails and screws.

B. For opaque finishes, apply wood filler in exposed nail and screw indentations and sand smooth.

C. On items to receive transparent finishes, use wood filler matching or blending with surrounding surfaces and of types recommended for applied finishes.

D. Finish work in accordance with AWI/AWMAC/WI (AWS), Section 5 - Finishing for grade specified and as follows:

1. Transparent:
   a. System - 5, Varnish, Conversion.
   b. Stain: As selected by Architect.
   c. Sheen: Flat.
2. Opaque:
   a. System - 5, Varnish, Conversion.
   b. Color: As selected by Architect.
   c. Sheen: Flat.

PART 3 EXECUTION

3.1 INSTALLATION

A. Condition woodwork to humidity and temperature conditions within normal range expected for the building prior to beginning installation.

B. Complete painting, wetwork, grinding and similar operations in areas to receive woodwork prior to beginning installation.

C. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.

D. Use fixture attachments in concealed locations for wall mounted components.

E. Use concealed joint fasteners to align and secure adjoining cabinet units.

F. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

G. Secure cabinets to floor using appropriate angles and anchorages.

H. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.2 ADJUSTING

A. Adjust installed work.

B. Adjust moving or operating parts to function smoothly and correctly.

3.3 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION

SECTION 07 13 00

SHEET WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sheet Waterproofing:

B. Drainage panels and protection boards.

C. Underslab membrane at tunnel waterproofing.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete substrate.

B. Section 07 21 00 - Thermal Insulation: Insulation used for protective cover.

1.3 ABBREVIATIONS

1.4 SUBMITTALS

A. Product Data: Provide data for membrane.

B. Shop Drawings: Indicate special joint or termination conditions and conditions of interface with other materials.

C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Membrane Manufacturer Qualifications: Company specializing in waterproofing sheet membranes with ten years experience.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application and until liquid or mastic accessories have cured.

1.7 WARRANTY

A. Provide five year manufacturer warranty for waterproofing failing to resist penetration of water , except where such failures are the result of structural failures of building. Hairline cracking of concrete due to temperature change or shrinkage is not considered a structural failure.

PART 2 PRODUCTS

2.1 WATERPROOFING APPLICATIONS

A. Self-Adhered HDPE Sheet Membrane Waterproofing: Use at vertical surfaces of concrete foundation walls and elevator pit walls.

1. Cover with drainage panel. Provide protection board where indicated.

2.2 MEMBRANE MATERIALS

A. Self-Adhered HDPE Sheet Membrane with Weather-Resistant Coating: Recommended by manufacturer for placement below concrete slabs and on outside face of below grade walls before placement of concrete.

1. Sheet Thickness: 60 mil (0.060 inch), minimum.
2. Adhesives, Sealants, Tapes, and Accessories: As recommended by membrane manufacturer.
3. Manufacturers:
   a. GCP Applied Technologies; Bithuthene 3000: www.gcpat.com/sle
   b. Polyguard Products, Inc; 650 system: www.polyguardproducts.com
   c. Tremco Commercial Sealants & Waterproofing; Paraseal GM/LG: www.tremcosealants.com
   d. W.R. MEADOWS, Inc; MEL-ROL: www.wrmeadows.com
4. Provide manufacturer's recommended underslab membrane for use at tunnel locations.

B. Detail Tape: As recommended by membrane manufacturer.

C. Membrane Sealant: As recommended by membrane manufacturer.

D. Termination Bars: Stainless steel; compatible with membrane and adhesives.

E. Adhesives: As recommended by membrane manufacturer.

2.3 ACCESSORIES

A. Sealant for Cracks and Joints In Substrates: Resilient elastomeric joint sealant compatible with substrates and waterproofing materials.

B. Protection Board: Rigid insulation specified in Section 07 21 00.

C. Drainage Panel: Drainage layer with geotextile filter fabric on earth side.

1. Composition: Dimpled polystyrene core; polypropylene filter fabric.
   a. Products:
      1) GCP Applied Technologies; Hydroduct 220: www.gcpat.com
      2) Polyguard Products; Polyflow 15P: www.polyguardproducts.com
      3) Tremco Commercial Sealants & Waterproofing; TREMDrain Series Drainage Mat: www.tremcosealants.com
      4) W.R. Meadows, Inc; Mel-Drain: www.wrmeadows.com/sle

PART 3 EXECUTION

3.1 PREPARATION

A. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions. Vacuum substrate clean.

B. Do not apply waterproofing to surfaces unacceptable to membrane manufacturer.

C. Seal moving cracks with sealant, not rigid filler, using procedures recommended by sealant and waterproofing manufacturers.

D. Concrete Surfaces for Adhesive Bonding: Prepare concrete substrate according to ASTM D5295/D5295M.

1. Remove substances that inhibit adhesion including form release agents, curing compounds admixtures, laitance, moisture, dust, dirt, grease and oil.

2. Repair surface defects including honeycombs, fins, tie holes, bug holes, sharp offsets, rutted cracks, ragged corners, deviations in surface plane, spalling and delaminations, as described in the reference standard.
3. Remove and replace areas of defective concrete as specified in Section 03 30 00.
4. Prepare concrete for adhesive bonded waterproofing using mechanical or chemical methods described in the referenced standard.
5. Test concrete surfaces as described in the referenced standards. Verify surfaces are ready to receive adhesive bonded waterproofing membrane system.

3.2 INSTALLATION - MEMBRANE

A. Install membrane waterproofing in accordance with manufacturer's instructions.

B. Unroll underslab waterproofing membrane with longest dimension parallel to direction of pour.

C. Place backing to the soil and fabric to the concrete.

D. Apply required preformed inside and outside corner boots prior to application of membrane per manufacturer's details.

E. Overlap side seams, 4 inches, and use manufacturer's edge trim seal or tape system. Overlap end laps a minimum of 3 inches, maximum of 4 inches. Seal joints with adhesive, and follow with fabric tape per manufacturer's requirements.

F. Install reinforcing steel for concrete, flash penetrations per manufacturer's requirements, and ensure surface is dry prior to placement of concrete. Place concrete within 30 days of the membrane installation.

G. For vertical surfaces, roll out membrane. Minimize wrinkles and bubbles.

H. Apply primer to clean, dust free surfaces per manufacturer's written instructions.

I. Self-Adhering Membrane: Remove release paper layer. Roll out on substrate with a mechanical roller to encourage full contact bond.

J. Side laps should be 3 inches minimum and staggered end laps should be 6 inches minimum. Seal permanently waterproof with a hard roller. All terminations of the membrane shall receive a troweled bead of detail sealant or mastic to a flat surface approximately 1/8 inch thick by 3/4 inch wide. The mastic shall be worked into cut edge terminations.

K. Reinforce membrane with multiple thickness of membrane material over joints, whether joints are static or dynamic.

L. Weather lap joints on sloped substrate in direction of drainage. Seal joints and seams.

M. Install 12 inch wide strip of detail tape centered along the vertical axis at all inside and outside corners. Install a 3/4 inch, 45 degree angle cant of detail sealant at all changes in plane including inside corners to 6 inches vertically and horizontally beyond the cant. Do not use wood or fiber cant strips.

N. At penetrations and drains provide detail sealant or liquid membrane per manufacturer's written instructions, and apply a second flashing sheet over the penetration extending a minimum of 6 inches from the detail. Seal all permanently exposed cut edge terminations with manufacturer's sealant or liquid membrane.

O. Membrane should be applied vertically in sections of 8 feet in length or less. When more than 8 feet, start from the lower foundation base, and provide a 6 inch overlap, shingling down on each ply of membrane. Seal membrane and flashings to adjoining surfaces. Install termination bar at all edges. Install counterflashing over all exposed edges.

P. Fishmouths and severe wrinkles shall be slit, flaps overlapped and repaired.

3.3 INSTALLATION - DRAINAGE PANEL AND PROTECTION BOARD

A. Place drainage panel directly against membrane, butt joints, place to encourage drainage downward. Scribe and cut boards around projections, penetrations, and interruptions.

B. Place protection board directly against drainage panel; butt joints. Scribe and cut boards around projections, penetrations, and interruptions.

END OF SECTION

SECTION 07 18 00

TRAFFIC COATINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:
1. Traffic bearing membrane coating.

B. Related Sections:
1. Applicable provisions of Division 01 shall govern all work under this Section.
2. Section 07 90 07 - Joint Protection for Parking Structures: Joint between traffic membrane and membrane termination.

1.2 REFERENCES

A. ASTM International:
1. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers -Tension.
2. ASTM D903 - Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
3. ASTM D1044 - Standard Test Method for Resistance of Transparent Plastics to Surface Abrasion.
4. ASTM D1360 - Standard Test Method for Fire Retardancy of Paints (Cabinet Method).
5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
6. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

B. Underwriters Laboratories Inc.:
1. UL - Fire Resistance Directory.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit product characteristics, limitations, and identify dissolving solvents, fuels, and potential destructive compounds.

C. Samples: Submit two 12x12 inch in size illustrating color, surface texture, and variations.

D. Manufacturer's Installation Instructions: Submit special environmental conditions required to install the Product and potential incompatibilities with adjacent materials.

E. Submit an unsigned sample of the warranty as required below.

1.4 CLOSEOUT SUBMITTALS

A. Section 01 70 00 – Execution and Closeout Requirements: Closeout procedures.

B. Operation and Maintenance Data: Submit procedures for stain removal, repairing surface, and cleaning.

C. Warranty: Submit signed warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum five years documented experience approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Maintain ambient storage temperature of 55 degrees F.

C. Keep away from fire or open flame.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not install materials when temperature is below 50 degrees F or above 90 degrees F.

C. Maintain this temperature range, 24 hours before, during and 72 hours after application.

D. Restrict traffic from area where materials are being installed or are curing.

1.8 WARRANTY

A. Section 01 70 00 – Execution Requirements: Product warranties and product bonds.

B. Materials Manufacturer and Installation Contractor shall be jointly and severally responsible and shall submit an affidavit signed by both parties warranting the installed system for a period of five years from date of final completion.

C. Warranty shall be non-prorated and shall cover loss of waterproofing and loss of more than 20% of traffic topping aggregate and may exclude fire, structural failure, acts of God, or willful damage other than intended usage. The traffic topping will be deemed to have lost more than 20% of its aggregate when its thickness is less than 0.05 inches.

D. Tears, leaks, and damaged or worn surfaces under warranty shall be repaired or replaced at no cost to Owner within six months of notification by Owner.

PART 2 PRODUCTS

2.1 TRAFFIC MEMBRANE

A. Manufacturers:
1. Neogard Corp. Model AutoGard II System.
2. Tremco Sealants and Waterproofing Model Vulkem Traffic Deck Coating System.
3. Sonneborn Building Products Model Sonogard Coating System
4. Substitutions: In accordance with Section 01 60 00 - Product Requirements.

2.2 COMPONENTS

A. Membrane: Fluid applied polyurethane waterproof, grey color; conforming to the following:

Property	Test	Result
Tensile Strength	ASTM D412	750 psi.
Moisture Vapor Permeability	ASTM E96	2.7 perms
Bond Strength	ASTM D903	18 lb/in width maximum.

B. Topping: Polyurethane compound, conforming to the following:

Property	Test	Result
Tensile Strength	ASTM D412	1500 psi.
Hardness	ASTM D2240	68
Elongation	ASTM D412	250%
Tear Strength	ASTM D1004	150 lb/in
Abrasion Resistance	ASTM C501	0.03 g/1000 cycles

C. Surface Primer: As recommended by membrane manufacturer.

D. Sealant: Polyurethane type, compatible with system and adjacent materials.

E. Aggregate: Sand or silicon carbide, uniformly graded, as recommended by manufacturer.

F. System shall be heavy duty system meant for automobile traffic.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify substrate is ready to receive work, surface is clean, dry and free of substances which could affect bond.

C. Do not begin work until concrete substrate has cured 28 days, minimum, and measured moisture content is not greater than 16 percent.

D. Test concrete surfaces with litmus paper for acceptable level of alkalinity.

E. Commencement of installation implies acceptance of concrete surface as suitable for coating system application.

3.2 PREPARATION

A. Clean substrate surface free of foreign matter.

B. Sawcut all control and construction joints and all cracks 1/16-inch in width or greater. Apply primer to sides and bond breaker to bottom of sawcut. Fill with sealant approved by membrane manufacturer.

C. Patch concrete substrate with filler to produce surface conducive to bond.

D. Apply a 1/2-inch bead of sealant at all locations where a horizontal surface abuts a vertical surface.

E. Protect adjacent surfaces.

3.3 INSTALLATION

A. Apply system materials.

B. Apply primer to prepared substrate to dry film thickness of 5 mils.

C. Cold joints, visible hairline cracks (up to 1/16-inch wide), and cracks that have been routed and sealed shall be cleaned, primed, and treated with a detail coat a minimum distance of 2 inches on each side of the crack or joint.

D. When primer is tack free, apply waterproof membrane base coat in strict accordance with manufacturer’s latest instructions. Membrane base coat shall be applied to a minimum total dry film thickness of 25 mils.

E. Following application and curing of waterproof membrane base coat, apply an intermediate coating having a minimum of 20 mils dry film thickness. Intermediate coating shall be

squeegeed and backrolled to ensure uniform thickness. While intermediate coating is still fluid, uniformly apply aggregate into coating and backroll as required to obtain an integral aggregate wear resistance system.

F. Following curing of the intermediate coating, remove the excess aggregate and apply a second intermediate coating along with an additional aggregate. This second intermediate coating shall have a minimum of 12 mils dry film thickness.

G. Following curing of the second intermediate coating, remove the excess aggregate and apply the top coating. The top coating shall have a minimum of 12 mils dry film thickness.

H. Extreme (heavy) duty system coating shall be a non-skid, abrasion resistant, integral aggregate traffic topping capable of protecting waterproof membrane base coat. This coating shall be installed in strict accordance with manufacturer's directions to a minimum thickness of 3/32-inches.

I. Verify mil thickness of all coats by use of wet-mil thickness gauge.

J. Provide waterproof membrane at base of columns and walls to produce a 4-inch high base.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Section 01 70 00 – Execution and Closeout Requirements: Protecting installed construction.

B. Do not permit traffic over unprotected surfaces.

3.5 CLEANING

A. Damaged, spotted or smeared parts of building and equipment shall be repaired and cleaned by this Contractor.

B. Work or materials damaged beyond repair, in opinion of Engineer, shall be replaced by this Contractor.

C. Remove all masking protection, debris, containers, equipment, materials, etc. from site and from surfaces.

END OF SECTION

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SECTION 07 19 07

WATER REPELLENTS FOR PARKING STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Water repellent coating applied to concrete surfaces.
      a. Top surfaces of parking.
      b. 6” up on vertical surfaces of walls and columns in parking.

B. Related Sections:
   1. Applicable provisions of Division 01 shall govern all work under this Section.
   2. Section 03 31 00 - Structural Concrete: Concrete surfaces.
   3. Section 07 90 07 - Joint Protection for Parking Structures.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM D1653 - Standard Test Method for Water Vapor Transmission of Organic Coating Films.
   2. ASTM G154 - Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.

1.3 SYSTEM DESCRIPTION

A. Applied Penetrant: Material to restrict moisture absorption in material being treated as recommended by manufacturer for specific substrate.

1.4 SUBMITTALS

A. Division 01 – General Requirements: Submittal procedures.

B. Product Data: Submit details of product description, tests performed, limitations to coating, and chemical properties including percentage of solids.

C. Manufacturer's Installation Instructions: Submit special procedures and conditions requiring special attention, and cautionary procedures required during application.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum five (5) years documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Division 01 – General Requirements: Product storage and handling requirements.

B. Protect coating liquid from freezing.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Division 01 – General Requirements: Environmental requirements.

B. Do not apply coating when surface temperature is lower than 50 degrees F or higher than 100 degrees F.

C. Do not apply coating when wind velocity exceeds manufacturer recommendations.

1.8 WARRANTY

A. Division 01 – General Requirements: Product warranties and product bonds.

B. Furnish five (5) year manufacturer warranty for water repellents.

PART 2 - PRODUCTS

2.1 WATER REPELLENTS

A. Manufacturers:
1. BASF Building Systems: Series: Hydrozo 100. www.buildingsystems.basf.com
2. Euclid Chemical Company: Series: Baracade Silane 100. www.euclidchemical.com
3. Pecora Corporation; Series: Klere Seal 9100-S. www.buildsite.com
4. ProSoCo, Inc.; Series SL100. www.prosoco.com
5. Sika Corporation: Sikagard 705L.
6. Substitutions: In accordance with Division 01 – General Requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Verify all crack and 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 coating.

3.2 PREPARATION

A. Delay Work until concrete substrate is cured minimum of 30 days.

B. Remove loose particles and foreign matter.

C. Remove oil or foreign substance with chemical solvent which will not affect coating.

D. Scrub and rinse surfaces with water and let dry.

3.3 APPLICATION

A. Apply at rate of 250 sq.ft/gallon by airless spray.

B. Apply in one continuous, uniform coat.

C. Allow to soak in and broom out puddles.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Division 01 – General Requirements: Protecting installed construction.

B. Protect adjacent surfaces not scheduled to receive coating.

C. Protect landscaping, property, and vehicles.

D. When applied to unscheduled surfaces, remove immediately by methods as instructed by coating manufacturer.

END OF SECTION

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SECTION 07 21 00

THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Board insulation with integral foil facer at masonry veneer wall construction.

B. Foamed-in-Place insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

C. Extruded polystyrene board insulation at foundation perimeter.

1.2 RELATED REQUIREMENTS

A. Section 07 25 00 - Weather Barriers: Separate air barrier and vapor retarder materials.

B. Section 07-5323 - Ethylene-Propylene-Diene-Monomer Roofing (EPDM): Installation requirements for board insulation over low slope roof deck specified in this section.

1.3 SUBMITTALS

A. Product Data: Provide data on product characteristics, performance criteria, and product limitations. Include Test Reports for wall assemblies that show compliance with the acceptance criteria of NFPA 285. Extension Reports (EEVs) may be submitted for review during permit review process.

B. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

1.4 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.1 APPLICATIONS

A. Insulation at Perimeter of Foundation: Extruded polystyrene board.

B. Insulation Inside Masonry Cavity Walls: Foil-faced polyisocyanurate board.

2.2 FOAM BOARD INSULATION MATERIALS

A. Extruded Polystyrene Board Insulation: Extruded polystyrene board; ASTM C578; with either natural skin or cut cell surfaces, and the following characteristics:

1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. R-value; 2 inch of material at 72 degrees F: 10, minimum.
4. Compressive Strength, ASTM D1621: 25 psi.
5. Board Edges: Square.
6. Water Absorption, Maximum: 0.3 percent, by volume.

7. Manufacturers:
   a. Dow Chemical Co: www.dow.com
   b. Owens Corning Corporation; Foamular 250: www.ocbuildingspec.com

B. Polyisocyanurate Board Insulation with Facers Both Sides: Rigid cellular foam, complying with ASTM C1289; Type I, aluminum foil both faces; Class 1, non-reinforced foam core.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Complies with fire resistance requirements shown on the drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
4. Compressive Strength: 16 psi
5. Board Size: 48 by 96 inch.
6. Board Thickness: 3 inches, unless noted otherwise.
7. Board Edges: Square.
8. Manufacturers:
   a. Carlisle Coatings & Waterproofing, Inc; R2+ Silver: www.carlisleccw.com/sle
   b. Hunter Panels, LLC; Xci Class A Foil: www.hunterxci.com
   c. Johns Manville; AP Foil-Faced: www.jm.com
   d. Rmax Inc.; ECOMAXci: www.rmax.com

2.3 FOAMED-IN-PLACE INSULATION

A. Foamed-in-place (FIP): Polyurethane foam, Class 1 fire resistive rating by independent laboratory.
1. Manufacturers:
   a. Dow Froth-Pak 1.75-25FS MSHA.
   b. Touch 'n Seal 1.75 pcf FR Standard.
   c. Tiger Foam TF600FR.

2.4 THERMAL BARRIER AT FOAM INSULATION

A. Portland cement based, designed for application to foam insulation.
B. Basis-of-Design: W.R. Grace, Monokote Z-3306 Thermal Barrier.
1. Other acceptable manufacturers:
   a. Isolatek International.
   b. Touch 'n Seal Ignition Barrier Coating.
   c. Tiger Foam Ignition Barrier.
C. Primer: As recommended by thermal barrier fireproofing manufacturer.
D. Fire Resistance: UL tested in enclosed corner test. The thermal barrier fireproofing shall remain in place for minimum 15 minutes of fire exposure.
E. Bond Strength: 500 psf minimum of urethane or polystyrene foam insulation.

2.5 ACCESSORIES

A. Sheet Vapor Retarder: Black polyethylene film for above grade application, 10 mil thick.

B. Tape joints of rigid insulation in accordance with insulation manufacturer's instructions.

C. Insulation Fasteners: Weather resistant, ceramic coated self-drilling screws with 2 inch diameter plastic washers of solid cap design with flat bottom for flush mounting. Use at walls with metal stud back-up.

1. Manufacturers:

a. Rodenhouse, Inc: Grip-Deck Self-Drilling Screws with Thermal-Grip ci washer (flat sytle): www.rodenhouse-inc.com

PART 3 EXECUTION

3.1 BOARD INSTALLATION AT FOUNDATION PERIMETER

A. Install boards horizontally on foundation perimeter.

1. Install in running bond pattern.

2. 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.

C. Backfill: Avoid damaging boards during backfill.

3.2 BOARD INSTALLATION AT EXTERIOR WALLS

A. Install boards to fit snugly between wall ties.

1. Fasten insulation boards through sheathing to exterior face of the stud framing using fasteners of appropriate length. Fasteners must be long enough that at least three full threads are visible inside wall framing. Fasten at 16 inches on center horizontally and 24 inches on center vertically.

B. Install boards horizontally on walls.

1. Install in running bond pattern.

2. Butt edges and ends tightly to adjacent boards and to protrusions.

C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.3 FOAMED-IN-PLACE INSULATION

A. Clean substrates prior to application of foamed-in-place insulation. Product is not compatible with silicone coatings.

B. Follow the manufacturer's written operating instructions. Install foam prior to installing the membrane or insulation. Limit application of product to areas of 8 inches wide by 2 inches thick, maximum. Use manufacturer's accessory product(s) for gaps less than 1/2 inch. Do not overfill restricted spaces.

3.4 THERMAL BARRIER

A. Remove loose or decomposed foam. If removal leaves voids through which air can move all the way through the assembly, install additional foam to prevent passage of air.

B. Apply thermal barrier to exposed interior foamed-in-place insulation that will not be protected by gypsum board.

C. If substrate condition is questionable, test to verify suitability to receive thermal barrier fireproofing.

D. Do not install until foam insulation has cured. Verify completion of work to be covered by fireproofing, including clips, hangers, and other attachments to or through substrate.

E. Substrate must be clean for bond of fireproofing. Install in accordance with UL design.

F. Remove overspray and excess materials immediately.

3.5 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 21 29

SPRAYED INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glass fiber insulation applied to underside of structure in the Garage Service Area.

1.2 RELATED REQUIREMENTS

A. Section 07 21 00 - Thermal Insulation.

1.3 SUBMITTALS

A. Product Data: Provide data on materials, describing insulation properties.

B. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.4 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 the work of this section with minimum five years of experience.

C. Products Specified by Flammability or Combustibility Criteria: Listed and classified by Underwriters Laboratories Inc.

1.5 FIELD CONDITIONS

A. Do not install insulation, when ambient and surface temperatures are lower than 40 degrees F.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Glass Fiber:

1. ThermaCoustic Industries; TC-417: www.thermacoustics.com
2. Monoglass Incorporated; MONOGLASS Spray-On White Fiber: www.monoglass.com

2.2 MATERIALS

A. Glass Fiber: ASTM C1014.

1. K factor: 0.25 K, when tested in accordance with ASTM C518.
2. Density: 3.5 lb/cu ft.
3. NRC: 1.00 for 2 inch thickenss.
4. Flame Spread and Smoke Developed Index: Less than 25/Less than 450, when tested in accordance with ASTM E84.
5. Combustibility: Passing ASTM E136.

2.3 ACCESSORIES

A. Primer: As required by insulation manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are clean, dry, and free of matter that may inhibit adhesion.

B. Verify that ceiling hangers and supporting clips have been are installed correctly.

3.2 PREPARATION

A. Mask and protect adjacent surfaces from overspray or damage.

B. Apply primer in accordance with manufacturer's instructions.

3.3 INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install insulation to a uniform monolithic density without voids.

C. Install to a minimum cured thickness of 3 inch.

3.4 PROTECTION

A. Do not permit subsequent construction work to disturb applied insulation.

END OF SECTION

SECTION 07 25 00

WEATHER BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Building Membrane: Materials to make exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and thru-wall penetrations water-vapor resistant and air tight.

1.2 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Vapor retarder under concrete slabs on grade.

B. Section 07 92 00 - Joint Sealants: Sealing building expansion joints.

1.3 SUBMITTALS

A. Product Data: Provide data on material characteristics.

B. Shop Drawings: Provide drawings of special joint conditions.

1.4 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation. Do not apply when temperatures are below 40 degrees F.

1.5 WARRANTY

A. Warranty: Manufacturer's minimum five year material warranty.

PART 2 PRODUCTS

2.1 BUILDING MEMBRANE

A. Building Membrane: Liquid-applied, liquid synthetic rubber, asphalt-free membrane, 40-mil dry film thickness, minimum.

1. Manufacturers:

a. W.R. Meadows, Inc; Air-Shield LSR: www.wrmeadows.com

b. GCP; Perm-A-Barrier NPL 10: www.gcpat.com

c. Prosoco; R-Guard VB: www.prosoco.com

B. Building Membrane Properties:

1. Air Permeance: 0.004 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.

2. Water Vapor Permeance: Less than 1 perm when tested in accordance with ASTM E96, Method B.

3. Water Penetration Resistance Around Nails: Pass, when tested in accordance with ASTM D1970/D1970M (modified).

4. Ultraviolet and Weathering Resistance: Approved in writing by manufacturer for minimum of 2 months weather exposure.

5. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
6. Seam and Perimeter Tape: As recommended by sheet manufacturer.

C. Accessories:

1. Detail Membrane: 40 mil thickness self-adhering flashing or manufacturer's recommended liquid applied flashing for openings.
2. Contact Adhesive as recommended by manufacturer.
3. Mastic: Solvent-based synthetic rubber.
4. Fill Compound: Polyurethane.
5. Insulation Adhesive: As recommended by manufacturer.

2.2 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

B. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Coatings:

1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
2. Where exterior masonry veneer is to be installed, install masonry anchors before installing weather barrier over masonry; seal around anchors air tight.
3. Mastic Coating: Install by trowel or roller to minimum thickness of 1/4 inch; use sheet seal to join to adjacent construction, seal air tight with sealant.
4. Use flashing to seal to adjacent construction and to bridge joints.

C. Openings and Penetrations in Exterior Weather Barriers:

1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with at least 4 inches wide; do not seal sill flange.
3. At openings to be filled with non-flanged frames, seal weather barrier to all sides of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.2 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION

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SECTION 07 42 13

METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured metal panels for screen walls at parking and soffits, with related flashings and accessory components.

1.2 RELATED REQUIREMENTS

A. Section 05-4000 - Cold-Formed Metal Framing.

B. Section 07 92 00 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

1.3 SUBMITTALS

A. Shop Drawings: Indicate dimensions, layout, joints, construction details, methods of anchorage. Provide dimensions of associated brake metal trim pieces, and integration of light fixtures.

B. Samples: Submit two metal samples of wall panel and soffit panel, 2 inch by 4 inch in size illustrating finish color, sheen, and texture. Do not submit manufacturer's color cards.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing the products specified in this section with minimum five years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store prefinished material off ground and protected from weather. Prevent twisting, bending, or abrasion, and provide ventilation to stored materials. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that may cause discoloration or staining of products.

1.6 WARRANTY

A. Correct defective work within a five year period after the Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.

B. Correct defective Work within a two year period after the Date of Substantial Completion, including defects in water tightness and integrity of seals.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. MP1 Perforated, Corrugated Metal Wall Panels, exposed fastener:

1. Basis of Design: Centria; EcoScreen Perforated Screenwall BR5-36: www.centria.com
2. Metal Sales; T5 Perforated Wall Panel: www.metalsales.us.com
3. Morin; BR7-35 Perforated: www.morincorp.com

B. MP2 Flush Metal Soffit Panels, concealed fastener:
   1. Basis of Design: Centria; IW-10A: www.centria.com
   2. Metal Sales; TLC-1 Panel: www.metalsales.us.com
   3. Morin; F-12 Flush: www.morincorp.com

2.2 MANUFACTURED METAL PANELS

A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
   1. Provide exterior panels, soffit 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.
   3. Design Pressures as indicated on Gneral Structural Notes drawing sheet.
   4. Maximum Allowable Deflection of Panel: 1/90 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 18 inch returns.
   9. Panel Finishes:
      a. Custom Fluoropolymer Coating System: Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil; color and gloss as indicated on drawings. Front and back of perforated panels.
      b. Exterior Panel Back Coating: Panel manufacturer's standard siliconized polyester wash coat.

B. Exterior Panels:
   1. Profile: Vertical; style as indicated.
   2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
   3. Perforated Panel Material: Precoated aluminum sheet, 0.040 inch minimum thickness.
   4. Color: As selected by Architect from manufacturer's custom line.
      a. Perforated Aluminum Panels: Metallic fluoropolymer coating system finish.

C. Soffit Panels:
   1. Profile: Flush panel.
   2. Material: Precoated steel sheet, 24 gage, minimum thickness.
   3. Color: As selected by Architect from manufacturer's full line.

D. Subgirts:
   1. Profile as indicated; to attach panel system to building.

E. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.

F. Expansion Joints: Same material, thickness and finish as exterior sheets; manufacturer's standard brake formed type, of profile to suit system.

G. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

H. Anchors: Stainless steel.

2.3 MATERIALS

A. Precoated Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M Structural Steel (SS) or Forming Steel (FS), with G90/Z275 coating; continuous coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

B. Precoated Aluminum Sheet: ASTM B209 (ASTM B209M), 3105 alloy, O temper, smooth surface texture; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.4 ACCESSORIES

A. Sealants:

1. Exposed Sealant: Elastomeric, silicone, polyurethane, or silyl-terminated polyether/polyurethane.

2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

B. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.1 PREPARATION

A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.

3.2 INSTALLATION

A. Install panels on screen walls and soffits in accordance with manufacturer's instructions. Coordinate layout of light fixtures, and install per approved shop drawings.

B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.

C. Fasten panels to structural supports; aligned, level, and plumb.

D. Use concealed fasteners unless otherwise approved by Architect.

3.3 TOLERANCES

A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

END OF SECTION

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SECTION 07 42 13.24

ALUMINUM METAL PLATE WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Manufactured metal panels for walls, with related flashings and accessory components.

1.2 RELATED REQUIREMENTS

A. Section 05 40 00 - Cold-Formed Metal Framing: Panel support framing.

B. Section 07 21 00 - Thermal Insulation: Continuous insulation.

C. Section 07 25 00 - Weather barriers: Weather barrier behind rainscreen wall system.

D. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.

E. Section 07 92 00 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.3 SUBMITTALS

A. Shop Drawings: Indicate dimensions, layout, joints, construction details, methods of anchorage, and details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories.

1. Provide distinction between factory-assembled, shop-assembled, and field-assembled work.

2. Submit exterior elevations showing wall mounted items including doors, windows, louvers, lighting fixtures, and through wall penetrations. Identify areas of special framing for field coordination of those items.

1.4 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 installing the products specified in this section with minimum five years of documented experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.

B. Store prefinished material off ground and protected from weather. Prevent twisting, bending, or abrasion, and provide ventilation to stored materials. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that may cause discoloration or staining of products.

1.6 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.

B. Correct defective Work within a two year period after Date of Substantial Completion, including defects in water tightness and integrity of seals.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Dri-Design; Aluminum Wall Panel System: www.dri-design.com

B. Other Acceptable Manufacturers:

1. Centria: www.centria.com

2.2 MANUFACTURED METAL PANELS

A. Metal Plate Wall Panel Assemblies:

1. Provide exterior panels and subframing clips.
2. Dry joint, pressure equalized rainscreen aluminum wall panel system:
   a. Pressure Equalization Cycling: Pass cycled pressure loading from 5 psf to 25 psf for 100 three-second cycles at 0.08 seconds or less, ASTM E1233.
   b. Air Infiltration: 0.12 cfm per sf of wall area, tested at 1.57 psf at 25 mph in accordance with ASTM E283.
   c. Water Penetration, Static: Pass ASTM E331 at a differential pressure of 10 percent inward, with 15 psf pressure differences for at least 15 minutes with 5 gallons per sf per hour of water applied.
   d. Water Penetration, Dynamic: Pass water penetration test under dynamic pressure of 6.24 psf in accordance with AAMA 501.1.
   e. Structural: System tested in accordance with ASTM 330 and certified to be without permanent deformation or failure of structural members.
3. Design Pressures as indicated on General Structural Notes drawing sheet.

B. Exterior Panels:

1. Profile: Horizontal; style as indicated.
2. Inside Corners: Welded at backside of wall panels at corner locations where metal plate is bent to form reveals.
3. Material: Precoated aluminum plate, 0.080 inch minimum thickness.
4. Panel Width: 12 inches.
5. Panel Joints: As indicated on drawings.
6. Panel Depth: 1 1/4 inch, nominal.
7. Color: Custom color as selected by Architect.

C. Subgirts:

1. Profile as indicated; to attach panel system to building.

D. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; brake formed to required angles.

E. Expansion Joints: Same material, thickness and finish as exterior sheets; manufacturer's standard brake formed type, of profile to suit system.

F. Trim: 0.040 inch aluminum, match finish and color of adjacent wall panels.

G. Fasteners: Stainless Steel.

2.3 MATERIALS

A. Precoated Aluminum Plate: Tension-leveled, fluoropolymer PVDF painted finish, 3003-H14 manganese alloy.

2.4 ACCESSORIES

A. Sealants:
   1. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
   2. Concealed Sealant: Non-curing butyl sealant or tape sealant.

B. Field Touch-up Paint: As recommended by panel manufacturer.

C. Bituminous Paint: Asphalt base.

PART 3 EXECUTION

3.1 PREPARATION

A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at intervals indicated.

3.2 INSTALLATION

A. Install panels on walls in accordance with manufacturer's instructions, including pressure equalized rainscreen installation method and installation guidelines.
   1. Formed metal wall panels have interlocking gutter and drainage system that is integral to the panel with single horizontal attachment for dry-joint rainscreen assembly.
   2. Attach panels in progressive interlocking method, engaging bottom of panel in top of previous panel working bottom up, and left to right.
   3. Install wall panels with single top attachment in pre-punched holes to allow individual panels to move due to thermal expansion.
   4. Do not compromise internal gutter.
   5. Install panels with provisions for thermal and structural movement.

B. Install weathertight seals at perimeter of wall openings.

C. Install weathertight escutcheons at pipe and conduit penetrations through exterior walls.

D. Install flashing and trim as wall panel work proceeds. Provide concealed fasteners.

E. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.

F. Fasten panels to structural supports; aligned, level, and plumb. Shim if necessary.

G. Install starter extrusion at base course and cut panel locations.

3.3 TOLERANCES

A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.4 CLEANING

A. Clean finished sufraces as recommended by panel manufacturer. Clear weep holes and drainage channels of obstructions and dirt.

END OF SECTION

SECTION 07 53 23

ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING (EPDM)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. EPDM membrane roofing system, including all components specified.

B. Commencement of work by Contractor shall constitute acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.

1. Require attendance with all parties directly influencing the quality of roofing work or affected by the performance of roofing work.
2. Notify Architect well in advance of meeting.

1.3 SUBMITTALS

A. Product Data:

1. Provide membrane manufacturer's printed data sufficient to show that all components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.
2. Where UL or FM requirements are specified, provide documentation that shows that the roofing system to be installed is UL-Classified or FM-approved, as applicable; include data itemizing the components of the classified or approved system.

B. Shop Drawings: Provide:

1. The roof membrane manufacturer's standard details customized for this project for all relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
2. For tapered insulation, provide project-specific layout and dimensions for each board.

C. Specimen Warranty: Submit with project specific information.

D. Executed Warranty.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Roofing installer shall have the following:

1. Certified Installer for Roofing Manufacturer's Roofing System specified.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.

B. Store materials clear of ground and moisture with weather protective covering.

C. Keep combustible materials away from ignition sources.

1.6 WARRANTY

A. Comply with all warranty procedures required by manufacturer, including notifications, scheduling, and inspections.

B. Warranty: Manufacturer's No Dollar Limit Warranty covering membrane, roof insulation, and metal flashings. Warranty includes wind damage up to 90 mph, and Hail puncture coverage.

1. Warranty Duration: 30 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer - Roofing System: Firestone Building Products LLC, Carmel, IN: www.firestonebpco.com

1. Roofing systems manufactured by others are acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:

a. Specializing in manufacturing the roofing system to be provided.

b. Minimum ten years of experience manufacturing the roofing system to be provided.

c. Roofing systems manufactured by the companies listed below are acceptable provided they are completely equivalent in materials and warranty conditions:
1) Carlisle Syntec Systems.
2) JohnsManville.

B. Manufacturer of Insulation and Cover Boards: Same manufacturer as roof membrane or manufacturer acceptable for roof system warranty.

C. Manufacturer of Metal Roof Edging: Same manufacturer as roof membrane or manufacturer acceptable for roof system warranty.

2.2 ROOFING SYSTEM DESCRIPTION

A. Roofing System: Ethylene-propylene-diene-monomer (EPDM) single-ply membrane.

1. Membrane Attachment: Fully adhered.

2. Slope: Deck is flat, provide slope of 1/4 inch per foot by means of tapered insulation.

3. Comply with applicable local building code requirements.

4. Provide assembly having Underwriters Laboratories, Inc. (UL) Class A Fire Hazard Classification.

5. Provide assembly complying with Factory Mutual Corporation (FM) Roof Assembly Classification, FM DS 1-28 and FM DS 1-29, and meeting minimum requirements of FM 1-90 wind uplift rating.

6. Provide assembly complying with Factory Mutual Corporation (FM) Roof Assembly Classification, FM DS 1-28 and 1-29, and meeting minimum requirements of FM wind uplift rating for calculated pressures at roof field, perimeter, and corner conditions.
    a. Ultimate Wind Speed: 120 mph, Exposure B.

B. Roofing System Components: Listed in order from the top of the roof down:
1. Membrane: Thickness as specified.
2. Insulation:
    a. Maximum Board Thickness: 3 inches; use as many layers as necessary; stagger joints in adjacent layers.
    b. Tapered: Slope as indicated; provide minimum R-value at thinnest point; place tapered layer on top.
    c. Total R Value: 50, average.
    d. Top Layer: Polyisocyanurate foam board, non-composite; cold adhesive attached.
    e. Intermediate Layer(s), If Any: Polyisocyanurate foam board, non-composite; cold adhesive attached.
    f. Bottom Layer: Polyisocyanurate foam board, non-composite; mechanically fastened.
    g. Crickets: Tapered insulation of same type as specified for top layer; slope as indicated.
3. Vapor Retarder: Manufacturer's standard for roofing system specified.
4. Deck Cover Board: Gypsum-based board, 5/8 inch thick; loose-laid, no attachment.

2.3 EPDM MEMBRANE MATERIALS

A. Roofing and Flashing Membrane: Black, cured synthetic single-ply membrane composed of ethylene propylene diene terpolymer (EPDM) with the following properties:
1. Reinforcement: None; membrane complying with ASTM D4637 Type I.
2. Thickness: 0.090 inch.
3. Nominal Thickness Tolerance: Plus/minus 10 percent.
4. Sheet Width: Provide the widest available sheets to minimize field seaming.

B. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

C. Self-Adhesive Flashing Membrane: Semi-cured 45 mil EPDM membrane laminated to 35 mil EPDM tape adhesive; QuickSeam Flashing by Firestone.

D. Pre-Molded Pipe Flashings: EPDM, molded for quick adaptation to different sized pipes; Firestone EPDM Pipe Flashing.

E. Self-Adhesive Lap Splice Tape: 35 mil EPDM-based, formulated for compatibility with EPDM membrane and high-solids primer; QuickSeam Splice Tape by Firestone.

F. Splice Adhesive: Synthetic polymer-based, formulated for compatibility with EPDM membrane and metal surfaces; SA-1065 Splice Adhesive by Firestone.

G. Bonding Adhesive: One part, synthetic polymer-based, low VOC, formulated for compatibility with EPDM membrane and wide variety of substrate materials, including masonry, wood, insulation facings, and cover board.

H. Adhesive Primer: Synthetic rubber based primer formulated for compatibility with EPDM membrane and tape adhesive, with VOC content less than 2.1 lb/gal; QuickPrime Plus LVOC by Firestone.

I. Seam Edge Treatment: EPDM rubber-based sealant, formulated for sealing exposed edges of membrane at seams; Lap Sealant HS by Firestone.

J. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by Firestone.

K. Water Block Seal: Butyl rubber sealant for use between two surfaces, not exposed; Water Block Seal by Firestone.

L. Metal Plates and Strips Used for Fastening Membrane and Insulation: Steel with Galvalume coating; corrosion-resistance meeting FM 4470 criteria.

M. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches wide by 0.10 inch thick; Firestone Termination Bar by Firestone.

N. Roof Walkway Pads: EPDM, 0.30 inch thick by 30 by 30 inches with EPDM tape adhesive strips laminated to the bottom; QuickSeam Walkway Pads by Firestone.

2.4 ROOF INSULATION AND COVER BOARDS

A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C1289 Type II Class 1, with the following additional characteristics:

1. Thickness: As indicated elsewhere.
2. Size: 48 inches by 96 inches, nominal.
    a. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches by 48 inches, nominal.
3. R-Value (LTTR):
    a. 1.0 inch Thickness: 6.0, minimum.
    b. 1.25 inch Thickness: 7.5, minimum.
    c. 1.5 inch Thickness: 9.0, minimum.
    d. 1.75 inch Thickness: 10.5, minimum.
    e. 2.0 inch Thickness: 12.1, minimum.
    f. 3.0 inch Thickness: 18.5, minimum.
    g. 4.0 inch Thickness: 25.0, minimum.
4. Compressive Strength: 20 psi when tested in accordance with ASTM C1289.
5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
6. Acceptable Product: ISO 95+ GL Polyisocyanurate Insulation by Firestone.
    a. Insulation manufactured by the companies listed below are acceptable provided they are completely equivalent in materials :
        1) Carlisle Syntec Systems; SecurShield HD Polyiso: www.carlislesyntec.com
        2) JohnsManville; Enrgy 3: www.jm.com

B. Gypsum-Based Cover Board: Non-combustible, water resistant gypsum core with embedded glass mat facers, complying with ASTM C1177/C1177M, and with the following additional characteristics:
   1. Size: 48 inches by 96 inches, nominal.
      a. Exception: Board to be attached using adhesive or asphalt may be no larger than 48 inches by 48 inches, nominal.
   2. Thickness: As indicated elsewhere.
   3. Surface Water Absorption: 2.5 g, maximum, when tested in accordance with ASTM C473.
   4. Surface Burning Characteristics: Flame spread of 0, smoke developed of 0, when tested in accordance with ASTM E84.
   5. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
   6. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
   7. Mold Growth Resistance: Zero growth, when tested in accordance with ASTM D3273 for minimum of 4 weeks.
   8. Acceptable Product: Georgia-Pacific DensDeck Prime FireGuard Type X.

C. Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

D. Adhesive for Insulation Attachment: Type as required by roof membrane manufacturer for roofing system and warranty to be provided; use only adhesives furnished by roof membrane manufacturer.

2.5 METAL ACCESSORIES

A. Parapet Copings: Formed metal coping with galvanized steel anchor/support cleats for capping any parapet wall; watertight, maintenance free, without exposed fasteners; butt type joints with concealed splice plates; mechanically fastened as indicated; Firestone PTCF or equal.
   1. Wind Performance:
      a. At least the minimum required when tested in accordance with ANSI/SPRI/FM 4435/ ES-1 Test Method RE-3, current edition.
      b. Provide product listed in current Factory Mutual Research Corporation Approval Guide with at least FM 1-90 rating.
   2. Description: Coping sections allowed to expand and contract freely while locked in place on anchor cleats by mechanical pressure from hardened stainless steel springs factory attached to anchor cleats; 8 inch wide splice plates with factory applied dual non-curing sealant strips capable of providing watertight seal.
   3. Material and Finish: 24 gage, 0.024 inch thick galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
   4. Dimensions:
      a. Wall Width: As indicated on the drawings.
      b. Piece Length: Minimum 144 inches.
      c. Curved Application: Factory fabricated in true radius.

5. Anchor/Support Cleats: 20 gage, 0.036 inch thick prepunched galvanized cleat with 12 inch wide stainless steel spring mechanically locked to cleat at 72 inches on center.
6. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, corners, intersections, curves, pier caps, and end caps; minimum 14 inch long legs on corner, intersection, and end pieces.
7. Fasteners: Factory-furnished; electrolytically compatible; minimum pull out resistance of 240 pounds for actual substrate used; no exposed fasteners.

2.6 ACCESSORY MATERIALS

A. Wood Nailers: PS 20 dimension lumber, Structural Grade No. 2 or better Southern Pine, Douglas Fir; or PS 1, APA Exterior Grade plywood; pressure preservative treated.
   1. Width: 3-1/2 inches, nominal minimum, or as wide as the nailing flange of the roof accessory to be attached to it.
   2. Thickness: Same as thickness of roof insulation.

PART 3 INSTALLATION

3.1 GENERAL

A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
B. Obtain all relevant instructions and maintain copies at project site for duration of installation period.
C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.
D. Perform work using competent and properly equipped personnel.
E. Temporary closures, which ensure that moisture does not damage any completed section of the new roofing system, are the responsibility of the applicator. Completion of flashings, terminations, and temporary closures shall be completed as required to provide a watertight condition.
F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F.
G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
   1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
   2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
   3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.
H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.

I. Consult membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep all adhesives, sealants, primers and cleaning materials away from all sources of ignition.

3.2 EXAMINATION

A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.

B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.

C. Examine roof substrate to verify that it is properly sloped to drains.

D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

3.3 PREPARATION

A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.

B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.

C. Fill all surface voids in the immediate substrate that are greater than 1/4 inch wide with fill material acceptable insulation to membrane manufacturer.

D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.

3.4 INSULATION AND COVER BOARD INSTALLATION

A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.

B. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.

C. Lay roof insulation in courses parallel to roof edges.

D. Neatly and tightly fit insulation to all penetrations, projections, and nailers, with gaps not greater than 1/4 inch. Fill gaps greater than 1/4 inch with acceptable insulation. Do not leave the roofing membrane unsupported over a space greater than 1/4 inch.

E. Mechanically fasten first layer of insulation to deck using mechanical fasteners per maunfacturer's fastening patterns to resist uplift pressures. Adhere subsequent layers of insulation in manufacturer's recommended adhesive per ribbon patterns to resist uplift pressures.

3.5 SINGLE-PLY MEMBRANE INSTALLATION

A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.

B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.

C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.

D. Install membrane adhered to the substrate, with edge securement as specified.

E. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.

F. Edge Securement: Secure membrane at all locations where membrane terminates or goes through an angle change greater than 2 in 12 inches using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.

1. Exceptions: Round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inches square.
2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

3.6 FLASHING AND ACCESSORIES INSTALLATION

A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.

B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.

1. Follow roofing manufacturer's instructions.
2. Remove protective plastic surface film immediately before installation.
3. Install water block sealant under the membrane anchorage leg.
4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
6. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
7. When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.

C. Roofing Expansion Joints: Install as shown on drawings and as recommended by roofing manufacturer.

D. Roof Drains:

1. Taper insulation around drain to provide smooth transition from roof surface to drain. Use specified pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope; slope not to exceed manufacturer's recommendations.
2. Position membrane, then cut a hole for roof drain to allow 1/2 to 3/4 inch of membrane to extend inside clamping ring past drain bolts.
3. Make round holes in membrane to align with clamping bolts; do not cut membrane back to bolt holes.
4. Apply sealant on top of drain bowl where clamping ring seats below the membrane.
5. Install roof drain clamping ring and clamping bolts; tighten clamping bolts to achieve constant compression.

E. Flashing at Penetrations: Flash all penetrations passing through the membrane; make flashing seals directly to the penetration.

1. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches deep, with at least 1 inch clearance from penetration, sloped to shed water.

3.7 FINISHING AND WALKWAY INSTALLATION

A. Install walkways at access points to the roof, around rooftop equipment that may require maintenance, and where indicated on the drawings.

B. Walkway Pads: Adhere to the roofing membrane, spacing each pad at minimum of 1.0 inch and maximum of 3.0 inches from each other to allow for drainage.

1. If installation of walkway pads over field fabricated splices or within 6 inches of a splice edge cannot be avoided, adhere another layer of flashing over the splice and extending beyond the walkway pad a minimum of 6 inches on either side.
2. Prime the membrane, remove the release paper on the pad, press in place, and walk on pad to ensure proper adhesion.

3.8 FIELD QUALITY CONTROL

A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes.

B. Perform all corrections necessary for issuance of warranty.

3.9 CLEANING

A. Clean all contaminants generated by roofing work from building and surrounding areas, including bitumen, adhesives, sealants, and coatings.

B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.

C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

3.10 PROTECTION

A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

END OF SECTION

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SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings and counterflashings.

B. Sealants for joints within sheet metal fabrications.

C. Reglets and accessories.

1.2 RELATED REQUIREMENTS

A. Section 06 10 00 - Rough Carpentry: Wood nailers for sheet metal work.

B. Section 07 92 00 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

C. Section 08 63 00 - Metal-Framed Skylights: Integral metal curbs.

1.3 SUBMITTALS

A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA 1793 requirements and standard details, except as otherwise indicated.

1.5 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

2.1 SHEET MATERIALS

A. Pre-Finished Galvanzied Steel: ASTM A653, with G90 zinc coating; minimum 24 gage thick base metal, shop pre-coated with PVDF coating.

1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.

2. Color: As selected by Architect from manufacturer's custom colors.

2.2 ACCESSORIES

A. Fasteners: Stainless steel, with soft neoprene washers.

B. Self-Adhered Underlayment: Rubberized sheet waterproof membrane complying with ASTM D 1970, self-adhering.

1. Resistance to Direct Exposure: 60 days minimum.

2. Temperature Resistance: 230 degrees F, minimum high temperature.

3. Water Vapor Permeance: 0.1 perm, maximum.
4. Provide one of the following:
   a. Firestone CladGard SA.
   b. Carlisle WIP Products 300 HT.
   c. Grace Ice and Water Shield HT.

C. Primer: Zinc chromate type.

D. Protective Backing Paint: Zinc molybdate alkyd.

E. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

F. Sealant to be Exposed in Completed Work: 1; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

G. Plastic Cement: ASTM D4586, Type I.

2.3 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Fabricate cleats of 22 gage type sheet metal, minimum 6 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 flat lock 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.

PART 3 EXECUTION

3.1 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.

3.2 INSTALLATION

A. Conform to drawing details.

B. Secure flashings in place using concealed fasteners. 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 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.2 SUBMITTALS

A. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, and firestopping test or design number.

B. Product Data: Provide data on product characteristics, performance ratings, and limitations.

1.3 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 the current-year classification or certification books of UL, FM, or ITS (Warnock Hersey) 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.

1.4 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.1 FIRESTOPPING - GENERAL REQUIREMENTS

A. Manufacturers:

1. 3M Fire Protection Products: www.3m.com/firestop

2. Hilti, Inc: www.us.hilti.com

3. Nelson FireStop Products: www.nelsonfirestop.com

4. Specified Technologies, Inc: www.stifirestop.com

B. Firestopping: Any material meeting requirements.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

2.2 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.

B. Perimeter Fire Barrier System: Concrete floor to Curtainwall Joints. Use any system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of the floor assembly.
   1. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.

C. Head-of-Wall Firestopping at Joints Between Non-Rated Floor and Fire-Rated Wall: Use any system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
   1. Movement: In addition, provide systems that have been tested to show movement capability as indicated.

D. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use any 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.

E. Through Penetration Firestopping: Use any system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Temperature Rise: In addition, provide systems that have been tested to show T Rating as indicated.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing materials to arrest liquid material leakage.

3.2 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 authority having jurisdiction.

C. Install labeling required by code.

3.3 FIELD QUALITY CONTROL

A. Independent Testing Agency: Inspection agency employed and paid by Contractor, will examine penetration firestopping in accordance with ASTM E2174, “Standard Practice for On-Site Inspection of Installed Fire Stops and ASTM E2393, “Standard Practice for On-Site Inspection of Installed Fire Stop Joint Systems.

B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.4 CLEANING

A. Clean adjacent surfaces of firestopping materials.

END OF SECTION

SECTION 07 90 07

JOINT PROTECTION FOR PARKING STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Sealants.
2. Joint backing.
3. Accessories.

B. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern all work under this Section.
2. Section 07 92 01 – Joint Sealants.

1.2 REFERENCES

A. ASTM International (ASTM):
1. ASTM C834 - Standard Specification for Latex Sealants.
2. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.
3. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
4. ASTM C1193 - Standard Guide for Use of Joint Sealants.
5. ASTM D1056 - Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.
6. ASTM D1667 - Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
7. ASTM D2628 - Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements.

1.3 SUBMITTALS

A. Division 01 – General Requirements: Submittal procedures.

B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

C. Samples: Submit two samples, 1/4-inch x 2-inch in size illustrating sealant colors for selection.

D. Manufacturer's Installation Instructions: Submit special procedures, surface preparation, and perimeter conditions requiring special attention.

E. Warranty: Include coverage for installed sealants and accessories failing to achieve watertight seal, exhibit loss of adhesion or cohesion, and sealants which do not cure.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five (5) years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum five (5) years documented experience, and approved by manufacturer.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Division 01 – General Requirements.

B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

1.6 COORDINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Coordinate Work with sections referencing this section.

PART 2 - PRODUCTS

2.1 JOINT SEALERS

A. Manufacturers:
1. Sika Corp., Model Sikaflex-2c, SL or NS.
2. BASF, Model Sonolastic SL2 or NP2.
3. Substitutions: In accordance with Division 01 – General Requirements.

2.2 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round rod compatible with sealant; ASTM D1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Verify substrate surfaces and joint openings are ready to receive work.

C. Verify joint backing and release tapes are compatible with sealant.

3.2 PREPARATION

A. All cracks and joints shall be routed open to 3/8-inch minimum.

B. Remove loose materials and foreign matter impairing adhesion of sealant.

C. Clean and prime joints.

D. Perform preparation in accordance with ASTM C1193.

E. Protect elements surrounding Work of this section from damage or disfiguration.

3.3 INSTALLATION

A. All cracks and joints shall be sealed.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

D. Install bond breaker where joint backing is not used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

F. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Tool joints smooth with adjacent surfaces.

3.4 CLEANING

A. Division 01 – General Requirements: Final cleaning.

B. Clean adjacent soiled surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

A. Division 01 – General Requirements: Protecting installed construction.

B. Protect sealants until cured.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Joint backings and accessories.

1.2 RELATED REQUIREMENTS

A. Appicable provisions of Division 01 - General Requirements shall govern Work under this Section.

B. Section 07 90 07 - Joint Protection for Parking Structures: Self-leveling pourable joint sealants.

1.3 SUBMITTALS

A. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes 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.
6. Substrates for which laboratory adhesion and/or compatibility testing is required.
7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.

B. 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.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

D. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

1.4 QUALITY ASSURANCE

A. Field Quality Control Plan:

1. Visual inspection of entire length of sealant joints.
2. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.
   a. For each different sealant and substrate combination, allow for one test. If any failure occurs, re-test joint type at no cost to Owner.
   b. Provide writtern report of joint testing with photo documentation.

B. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.

1. Sample: At least 18 inch 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 prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.

1.5 WARRANTY

A. Correct defective work within a five year period after date of Substantial Completion.

B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Nonsag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com
2. Dow Corning Corporation: www.dowcorning.com
3. Momentive Performance Materials, Inc (formerly GE Silicones): www.momentive.com
4. Pecora Corporation: www.pecora.com
5. Tremco Global Sealants: www.tremcosealants.com
6. Sika Corporation: www.usa-sika.com

B. Selfleveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.
1. BASF Construction Chemicals-Building Systems: www.buildingsystems.basf.com
2. Pecora Corporation: www.pecora.com
3. Tremco Global Sealants: www.tremcosealants.com
4. Sika Corporation: www.usa-sika.com

2.2 JOINT SEALANT APPLICATIONS

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on the drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
a. Wall expansion and control joints.
b. Joints between door, window, and other frames and adjacent construction.
c. Vertical plane moving joints with metal or glass on both sides, joint length less than 5 feet.
d. Vertical plane moving joints with metal or glass on both sides, joint length greater than 5 feet.
e. Joints between different exposed materials.
f. Other joints indicated below.

2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    a. Joints between door, window, and other frames and adjacent construction.
    b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
        1) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
    c. Perimeter of plumbing fixtures.
    d. Plastic laminate countertops, between countertops and adjacent materials.
    e. Bathrooms, showers, kitchens, and other high humidity or wet service areas.
    f. Vertical plane moving joints with metal or glass on both sides.
    g. Horizontal joints in slabs, paving, and walks.
    h. Other horizontal joints.
    i. Other joints indicated below.
3. Do not seal the following types of joints.
    a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
    b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
    c. Joints where installation of sealant is specified in another section.
    d. Joints between suspended panel ceilings/grid and walls.

B. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.3 NONSAG JOINT SEALANTS

A. SNT-01 - Single component, mildew-resistant acrylic-latex sealant, paintable: ASTM C834
1. Basis of Design Product:
    a. Pecora Corporation; Pecora AC-20 +Silicone: www.pecora.com

B. SNT-02 - Silicone Sealant: ASTC C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM D2240.
2. Color: To be selected by Architect from manufacturer's standard range.
3. Cure Type: Single-component, neutral moisture curing
4. Service Temperature Range: Minus 35 to 140 degrees F.
5. Basis of Design Product:
    a. Dow Corning Corporation; Dow Corning 786 Silicone Sealant: www.dowcorning.com

C. SNT-03 - Silicone Sealant: ASTM C920, Grade NS, Uses NT, G, M, A and O; single component; not expected to withstand continuous water immersion or traffic. Non-staining to stone per ASTC C1248.
1. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM D2240.
2. Color: To be selected by Architect from manufacturer's standard range.

3. Basis of Design Product:
    a. Dow Corning Corporation; Dow Corning 756 SMS Building Sealant; www.dowcorning.com

D. SNT-04 - Silicone Sealant: ASTM C920, Grade NS, Uses NT, G, A and O; single or multicomponent; not expected to withstand continuous water immersion to traffic.
1. Hardness Range: 40 to 50, Shore A, when tested in accordance with ASTM D2240.
2. Color: To be selected by Architect from manufacturer's standard range.
3. Service Temperature Range: Minus 20 to 150 degrees F.
4. Products:
    a. Dow Corning Corporation; Dow Corning 983 Structural Glazing Sealant; www.dowcorning.com
    b. Tremco Global Sealants; Proglaze Sealant: www.tremcosealants.com

E. SNT-05 - Silicone Sealant: ASTM C920, Grade NS, Uses NT, G, A and O; single component; not expected to withstand continuous water immersion or traffic.
1. Hardness Range: 30 to 40, Shore A, when tested in accordance with ASTM D2240.
2. Color: To be selected by Architect from manufacturer's standard range.
3. Service Temperature Range: Minus 40 to 300 degrees F.
4. Basis of Design Product:
    a. Dow Corning Corporation; Dow Corning 795 Silicone Building Sealant; www.dowcorning.com

2.4 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B.
2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type C - Closed Cell Polyethylene.
3. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.1 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.

3.2 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. 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.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.3 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet, notify Architect immediately.

C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

D. Repair destructive test location damage immediately after evaluation and recording of results.

END OF SECTION

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SECTION 07 92 01

JOINT SEALANT SCHEDULE

SCHEDULES

INTERIOR JOINT SEALANT SCHEDULE

LOCATION	**SNT-01**	**SNT-02**	**SNT-03**	**SNT-04**	**SNT-05**
INTERIOR					
Frames and other static, non-stressed joints	**X**				
Perimeter of Plumbing fixtures		**X**			
Plastic Laminate countertops, between countertops & adjacent materials		**X**			
Bathrooms, showers, kitchens, other high humidity or wet service areas		**X**			
Vertical plane moving joints in masonry, or with masonry on one side			**X**		
Vertical plane moving joints with metal or glass on both sides				**X**	

EXTERIOR JOINT SEALANT SCHEDULE

LOCATION	**SNT-01**	**SNT-02**	**SNT-03**	**SNT-04**	**SNT-05**
EXTERIOR					
Frames and other static, non-stressed joints in masonry or concrete, or with masonry or concrete on one side			**X**		
Frames and other static, non-stressed joints with metal or glass on both sides				**X**	
Vertical plane moving joints in masonry, or with masonry on one side			**X**		
Vertical plane moving joints with metal or glass on both sides, joint length less than 5 feet				**X**	
Vertical plane moving joints, with metal or glass on both sides, joint length 5 feet or greater					**X**

END OF SECTION

SECTION 07 95 13

EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Expansion joint cover assemblies for floor, wall, and soffit surfaces.

B. Pre-compressed expansion joints.

1.2 RELATED REQUIREMENTS

A. Applicable provisions of Division 01 shall govern all Work under this Section.

1.3 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, effected adjacent construction and anchorage locations.

C. Samples: Submit color samples of pre-compressed expansion joints for color match of adjacent materials. Samples shall be minimum of 4 inches in length.

D. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Expansion Joint Cover Assemblies:

1. Construction Specialties, Inc: www.c-sgroup.com
2. Emseal Joint Systems, Ltd: www.emseal.com
3. Inpro: www.inprocorp.com
4. MM Systems Corp: www.mmsystemscorp.com
5. Watson Bowman Acme Corp: www.wbacorp.com

2.2 EXPANSION JOINT COVER ASSEMBLY APPLICATIONS

A. Parking to Commercial Tennant Space Joints:

1. Horizontal Joints at Curtainwall/Entrance Doors: Stainless steel cover plate, Construction Specialties; PC-400 (stainless steel): www.c-sgroup.com
2. Provide pre-compressed expansion joint, Emseal Colorseal, at joint below cover plate to limit water from leaking between floors.

B. Wall to Wall Joints Subject to Thermal Movement:

1. Provide pre-compressed expansion joint; Emseal Colorseal.

2.3 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. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

B. Silicone-coated, precompressed seal: Hydrophobic cellular foam.

C. Sliding Cover Plate Type Covers: Provide plate with beveled edges and neat fit that does not collect dirt.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.

1. Exposed Finish at Floors: Mill finish or natural anodized.

B. Anchors and Fasteners: Stainless steel.

C. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

PART 3 EXECUTION

3.1 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.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Fire-rated hollow metal doors and frames.

D. Thermally insulated hollow metal doors with frames.

E. Hollow metal borrowed lites glazing frames.

1.2 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware.

B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.

C. Section 09-9000 - Painting and Coating: Field painting.

1.3 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.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years documented experience.

1.5 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

2.1 MANUFACTURERS

A. Hollow Metal Doors and Frames:

1. Assa Abloy Ceco or Curries: www.assaabloydss.com
2. Steelcraft, an Allegion brand: www.allegion.com/us

2.2 DESIGN CRITERIA

A. Requirements for Hollow Metal Doors and Frames:

1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.
2. Accessibility: Comply with ICC A117.1 and ADA Standards.
3. Door Top Closures: Flush with top of faces and edges.
4. Door Texture: Smooth faces.
5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Use tamper-resistant fasteners. Torx security screws. 18 gage cold rolled steel with powder coat finish. Color as selected by Architect.
    a. Typical Lite Kit: Low profile, tapered edge equal to National Guard Products, L-FRA100.
    b. LIte Kit for Glass Types with overall thickness greater than 1 inch: Square profile, equal to National Guard Products, L-GLF100-SP.
6. Hardware Preparation: In accordance with BHMA A156.115, with reinforcement welded in place, in addition to other requirements specified in door grade standard.

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.

2.3 HOLLOW METAL DOORS

A. 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 1 - Full Flush.
    d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
2. Core Material: Polyurethane, 1.8 lbs/cu ft minimum density.
3. Door Thickness: 1-3/4 inch, nominal.

B. 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 1 - Full Flush.
    d. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
2. Core Material: Vertical steel stiffeners.
3. Door Thickness: 1-3/4 inch, nominal.

C. 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 1 - Full Flush.

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").

a. Provide units listed and labeled by UL (DIR) or ITS (DIR).

b. Attach fire rating label to each fire rated unit.

c. Smoke and Draft Control Doors (Indicated with letter "S" on Drawings and/or Door Schedule): Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire-rated doors, and the following;

4) Maximum Air Leakage: 3.0 cfm/sq ft of door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.

5) Gasketing: Provide gasketing or edge sealing as necessary to achieve leakage limit.

6) Label: Include the "S" label on fire-rating label of door.

3. Core Material: Mineral board.

4. Door Thickness: 1-3/4 inch, nominal.

2.4 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. 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 gage, 0.067 inch, minimum.

3. Weatherstripping: Separate, see Section 08 71 00.

C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.

1. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

D. Door Frames, Fire-Rated: Full profile/continuously welded type.

1. Fire Rating: Same as door, labeled.

2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

F. Mullions for Pairs of Doors: Removable type, with profile similar to jambs.

G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

H. Transom Bars: Fixed, of profile same as jamb and head.

I. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

J. Frame reinforcements:

1. Hinge reinforcement: 7 gage.

2. Provide high frequency hinge reinforcements at top and bottom hinge of all exterior frames and high traffic applications.
3. Surface mounted closers, overhead stops, overhead door holders reinforcement shall be 14 gage steel plate welded inside jamb.
4. Reinforce for rim mounted strikes with 14 gage steel sheet welded on inside of jamb.
5. Drill and tap for surface mounted hardware at jobsite.

K. Electrified openings shall be prepped per approved hardware submittal.

2.5 ACCESSORIES

A. Glazing: As specified in Section 08 80 00, 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. Astragals for Double Doors: Specified in Section 08 71 00.

D. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

E. Grout for Frames: Portland cement grout with maximum 4 inch slump for hand troweling; thinner pumpable grout is prohibited.

F. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

2.6 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

PART 3 EXECUTION

3.1 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.2 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. Coordinate installation of hardware.

F. Coordinate installation of glazing.

3.3 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified door and frame standards or custom guidelines indicated.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

3.4 ADJUSTING

A. Adjust for smooth and balanced door movement.

END OF SECTION

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SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flush wood doors; flush and flush glazed configuration; fire rated, non-rated, and special function.

1.2 RELATED REQUIREMENTS

A. Section 08 11 13 - Hollow Metal Doors and Frames.

B. Section 08 71 00 - Door Hardware.

C. Section 08 80 00 - Glazing.

1.3 SUBMITTALS

A. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

B. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.

C. Specimen warranty.

D. Samples: Submit two samples of door veneer, 6 by 6 inch in size illustrating wood grain, stain color, and sheen.

E. Warranty, executed in Owner's name.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.

B. Heavy Duty Performance Level: Comply with WDMA workmanship for faces, vertical edges, crossbands, horizontal edges and dimensional tolerances.

C. Installed Fire Rated Door and Transom Panel Assembly: Conform to NFPA 80 for fire rated class as indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.6 WARRANTY

A. Interior Doors: Provide manufacturer's warranty for 2 years.

B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wood Veneer Faced Doors:

1. Eggers Industries: www.eggersindustries.com
2. Graham Wood Doors: www.grahamdoors.com
3. Marshfield-Algoma by Masonite Architectural: www.marshfielddoors.com
4. VT Industries: www.vtindustries.com

2.2 DOORS AND PANELS

A. Doors: See drawings for locations and additional requirements.

1. Quality Level: Premium Grade, Extra Heavy Duty performance, in accordance with WDMA I.S. 1A.
2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.

1. Provide solid core doors at all locations.
2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with NFPA 252 or UL 10B - Negative (Neutral) Pressure; Underwriters Laboratories Inc. (UL) or Intertek/Warnock Hersey (WHI) labeled without any visible seals when door is open.
3. Smoke and Draft Control Doors (Indicated as "S" on Drawings): In addition to required fire rating, provide door assemblies tested in accordance with UL 1784 with maximum air leakage of 3.0 cfm per sq ft of door opening at 0.10 inch w.g. pressure at both ambient and elevated temperatures for "S" label; if necessary, provide additional gasketing or edge sealing.
4. Wood veneer facing with factory transparent finish where indicated on drawings.
5. Vertical Edges (Stiles): Matching edges to match face material. Edges applied after face.
6. Horizontal Edges (Rails): Mill option structural composite lumber or hardwood lumber, no exposed intumescent.
7. Face Adhesives: Type 1.

2.3 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type particleboard core (PC), plies and faces as indicated.

B. Fire Rated Doors: Mineral core type, with fire resistant composite core (FD), plies and faces as indicated above; with core blocking as required to provide adequate anchorage of hardware without through-bolting.

2.4 DOOR FACINGS

A. Veneer Facing for Transparent Finish: Species and slice as indicated on Schedule of Interior Materials, 09-0601, HPVA Grade A, with book match between leaves of veneer, balance match of spliced veneer leaves assembles on door or panel face.

1. "Pair Match" each pair of doors; "Set Match" pairs of doors within 10 feet of each other when doors are closed.

2.5 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Cores Constructed with stiles and rails:

1. Provide solid blocks at lock edge for hardware reinforcement.

2. Provide solid blocking for other throughbolted hardware.

C. Glazed Openings: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.

F. Provide edge clearances in accordance with the quality standard specified.

2.6 FACTORY FINISHING - WOOD VENEER DOORS

A. Finish work in accordance with WDMA I.S. 1A for Grade specified and as follows:

1. Transparent:

a. System - TR-6, Catalyzed Polyurethane.

b. Sheen: Flat.

B. Factory finish doors in accordance with approved sample.

2.7 ACCESSORIES

A. Glazing: As specified in Section 08 80 00.

B. Glazing Stops:

1. Non-Rated doors: Wood, of same species as door facing, butted corners; prepared for countersink style tamper proof screws.

2. Rated doors: Metal lite kit, mitered corners; prepared for countersink style tamper proof screws.

C. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.

D. Astragals for Fire-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.

1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

3.2 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

END OF SECTION

SECTION 08 31 00

ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall access door and frame units.

B. Ceiling access door and frame units.

C. Floor access door and frame units, exterior.

1.2 SUBMITTALS

A. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

B. Shop Drawings: Indicate exact position of all access door units.

PART 2 PRODUCTS

2.1 ACCESS DOOR AND PANEL APPLICATIONS

A. Walls, Unless Otherwise Indicated:

1. Material: Steel.
2. Size: 12 by 12 inch, unless otherwise indicated.
3. Standard duty, hinged door.
4. In All Wall Types: Surface mounted face frame and door surface flush with frame surface.
5. In Gypsum Board: Drywall bead frame with door surface flush with wall surface.

B. Walls in Wet Areas:

1. Material: Steel, hot-dipped zinc or zinc-aluminum-alloy coated.
2. Size: 12 by 12 inch, unless otherwise indicated.
3. Standard duty, hinged door.
4. In All Wall Types: Surface mounted face frame and door surface flush with frame surface.

C. Fire Rated Walls: See drawings for wall fire ratings.

1. Material: Steel.
2. Size: 12 by 12 inch, unless otherwise indicated.
3. Uninsulated, single thickness door panel.

D. Ceilings, Unless Otherwise Indicated: Same type as for walls.

1. Material: Steel.
2. Size in Lay-in Grid Ceilings: To match grid module.
3. Size in Other Ceilings: 12 by 12 inch, unless otherwise indicated.
4. Standard duty, hinged door.

E. Fire Rated Ceilings: See drawings for ceiling fire ratings.

1. Material: Steel.

2. Size: 12 by 12 inch, unless otherwise indicated.
3. Standard duty, hinged door.

F. Exterior Floor-Mounted Access Units:

1. Location: As indicated on drawings.
2. Size: 48 inch by 48 inch.

2.2 WALL AND CEILING UNITS

A. Manufacturers:

1. Acudor Products Inc: www.acudor.com
2. Babcock-Davis: www.babcockdavis.com
3. Karp Associates, Inc: www.karpinc.com

B. Access Doors: Factory fabricated door and frame units, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies that units are to be installed in.

1. Door Style: Single thickness with rolled or turned in edges.
2. Frames: 16 gage, 0.0598 inch, minimum.
3. Units in Fire Rated Assemblies: Fire rating as required by applicable code for the fire rated assembly that access doors are being installed.
4. Steel Finish: Primed.
5. Hardware:
   a. Hardware for Fire Rated Units: As required for listing.
   b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
   c. Latch/Lock: Tamperproof tool-operated cam latch.

2.3 FLOOR ACCESS UNITS

A. Manufacturers:

1. Bilco Company; JD-2H20: www.bilco.com/sle

B. Floor Door and Frame Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies units are to be installed in.

1. Hardware: Zinc plated and chromate sealed.
   a. Hinges: Heavy duty forged brass with stainless steel pins.

C. Exterior Floor Access Units: Reinforced steel diamond pattern plate cover, minimum 1/4 inch thick.

1. Reinforced for an AASHTO H-20 Wheel Load.
2. Operation: Manual opening, and manual closing with standard slam lock.
   a. Automatic hold open arm with red vinyl grip.
3. Frame: 1/4 inch steel channel frame with welded 1-1/4 inch by 1-1/4 inch anchor flange.
4. Cover Pattern: Diamond tread plate.
5. Finish: Rust inhibiting primer.

PART 3 EXECUTION

3.1 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

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SECTION 08 31 15
FLOOR ACCESS DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Provide factory-fabricated floor access doors for:
a. ATC tunnel.
b. Stormwater Storage Tank.

B. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern Work under this Section.

1.2 REFERENCES

A. American Association of State Highway Transportation Officials (AASHTO:
1. AASHTO H-20 – Specification for Wheel Load.

B. International Organization for Standardization (ISO), ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, phone: +41 22 749 01 11, fax: +41 22 733 34 30.
1. ISO 9001:2008 Certified.

C. Occupational Safety & Health Administration (OSHA)
1. OSHA 29 CFR 1910.23 – Guarding Floor and Wall Openings and Holes.

1.3 SUBMITTALS

A. Division 01 – General Requirements: Requirements for submittals.

B. Product Data: Submit manufacturer's product data.

C. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.

D. Warranty: Submit executed copy of manufacturer's standard warranty.

1.4 CLOSEOUT SUBMITTALS

A. Division 01 – General Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of floor access doors.

1.5 QUALITY ASSURANCE

A. Manufacturer: A minimum of five (5) years experience manufacturing similar products.

B. Installer: A minimum of two (2) years experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001:2008 Quality Standards including in-house engineering for product design activities.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.7 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of twenty-five years from the date of purchase.

B. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Manufacturer: Type J-AL H20 Channel Frame Loading Access Door by The Bilco Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-933-8478, Web: www.bilco.com.

2.2 ACCESS DOOR

A. Furnish and install where indicated on plans vault access door Type J-AL H20, size as shown on the Drawings. Length denotes hinge side. The floor access door shall be single leaf and pre-assembled from the manufacturer.

B. Performance Characteristics:
1. Cover: Shall be reinforced to support AASHTO H-20 wheel load with a maximum deflection of 1/150th of the span. Manufacturer to provide structural calculations stamped by a registered Professional Engineer upon request.
2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
3. Operation of the cover shall not be affected by temperature.
4. Entire door, including all hardware components, shall be highly corrosion resistant.

C. Cover: Shall be 1/4" (6mm) aluminum diamond pattern.

D. Frame: Channel frame shall be extruded aluminum with bend down anchor tabs around the perimeter.

E. Hinges: Shall be specifically designed for horizontal installation and shall be through bolted to the cover with tamperproof Type 316 stainless steel lock bolts and shall be through bolted to the frame with Type 316 stainless steel bolts and locknuts.

F. Drain Coupling: Provide a 1-1/2" (38mm) drain coupling located in the right front corner of the channel frame [note: can be placed at a different location if specified].

G. Lifting mechanisms: Manufacturer shall provide the required number and size of compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and to act as a check in retarding downward motion of the cover when closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe fastened to a formed 1/4" (6mm) gusset support plate.

H. A removable exterior turn/lift handle with a spring loaded ball detent shall be provided to open the cover and the latch release shall be protected by a flush, gasketed, removable screw plug].

I. Hardware:
   1. Hinges: Heavy forged Type 316 stainless steel hinges, each having a minimum 1/4" (6mm) diameter Type 316 stainless steel pin, shall be provided and shall pivot so the cover does not protrude into the channel frame.
   2. Cover shall be equipped with a hold open arm which automatically locks the cover in the open position.
   3. Cover shall be fitted with the required number and size of compression spring operators. Springs and spring tubs shall be Type 316 stainless steel.
   4. A Type 316 stainless steel snap lock with fixed handle shall be mounted on the underside of the cover.
   5. Hardware: Shall be Type 316 stainless steel throughout.

J. Finishes: Factory finish shall be mill finish aluminum with bituminous coating applied to the exterior of the frame.

2.3 FALL PROTECTION GRATING SYSTEM

A. Furnish and install on vault access doors, where indicated on plans, fall protection grating system. Door manufacturer shall install the grating system when the door is fabricated or field install (by others) on existing doors already in use. If field installation is necessary, grating system shall be installed per the manufacturer's instructions.

B. Performance Characteristics:
   1. Grating panel(s) shall be high visibility safety yellow in color.
   2. Grating panel(s) shall lock automatically in the full open position.
   3. Grating system shall have a twenty-five (25) year warranty.
   4. Grating panel(s) shall have a provision for locking to prevent unauthorized opening.

C. Grating: Panels shall be aluminum with a powder coat paint finish and designed to meet OSHA 29 CFR 1910.23 requirements for fall protection.

D. Hold open feature: A Type 316 stainless hold open device shall be provided to lock the cover in the fully open 90 degree position.

E. Hardware: All hardware shall be Type 316 stainless steel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Division 01 – General Requirements: Coordination and project conditions.

B. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.
   1. Test units for proper function and adjust until proper operation is achieved.
   2. Repair finishes damaged during installation.
   3. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION

SECTION 08 33 23

OVERHEAD COILING DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Overhead coiling doors, operating hardware, fire-rated and exterior, manual operation.

B. Wiring from electric circuit disconnect to operator to control station.

1.2 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.

C. Test Reports: Accredited testing lab report indicating maximum opening size (width and height) and resultant maximum allowable Design Pressure Rating for coiling door assembly. Report shall be stamped and signed by a licensed Engineer.

D. Maintenance Data: Indicate lubrication requirements and frequency and periodic adjustments required.

1.3 WARRANTY

A. Manufacturer's Material and Workmanship Warranty for coiling door assembly for Design Pressure Rating indicated: 2 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Overhead Coiling Doors:

1. Raynor Door; FireCoil: www.raynor.com
2. Cornell Iron Works, Inc: www.cornelliron.com

2.2 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 slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 6.
3. Nominal Slat Size: 2 inches wide x required length.
4. Finish: galvanized with powder coat finish.
5. Color: Custom color, as selected by Architect.
6. Guides: Angles; galvanized steel.
7. Hood Enclosure: Manufacturer's standard; primed steel.
8. Manual hand chain lift operation.

9. Mounting: Surface mounted.
10. Locking Devices: Lock and latch handle on outside.

B. Fire-Rated Coiling Doors: Steel slat curtain; conform to NFPA 80.

1. Rating: As indicated on Drawings.
2. Provide products listed and labeled by ITS (DIR) or UL (DIR) as suitable for the purpose specified and indicated.
3. Oversized Openings: Provide certificate of compliance from authorities having jurisdiction indicating approval of fire rated units and operating hardware assembly.
4. Sandwich slat construction with insulated core of foamed-in-place polyurethane insulation; minimum R-value of 6.
5. Nominal Slat Size: 2 inches wide by required length.
6. Finish: Powder coat, color as selected from full range of RAL colors.
7. Guides: Angles; primed steel.
8. Hood Enclosure: Manufacturer's standard; primed steel.
9. Release Mechanism: Fusible link activated with automatically governed closing speed.
10. Manual hand chain lift operation.
11. Mounting: Surface mounted.
12. Locking Devices: Lock and latch handle on outside.

2.3 MATERIALS

A. Curtain Construction: Interlocking slats.

1. Slat Ends: Alternate slats fitted with end locks to act as wearing surface in guides and to prevent lateral movement.
2. Curtain Bottom: Fitted with angles to provide reinforcement and positive contact in closed position.
3. Weatherstripping: Moisture and rot proof, resilient type, located at jamb edges, bottom of curtain, and where curtain enters hood enclosure of exterior doors.

B. Steel Slats: Minimum thickness, 24 gage; ASTM A653 galvanized steel sheet.

1. Galvanizing: Minimum G90/Z275 coating.

C. Steel Guides: ASTM A36/A36M steel angles, size as indicated, hot-dip galvanized per ASTM A 123/A 123M.

D. Hood Enclosure: Internally reinforced to maintain rigidity and shape.

1. Prime paint.

E. Lock Hardware:

1. Lock: Cylinder type. Coordinate keying with Section 08-7100.
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

3.1 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install fire-rated doors in accordance with NFPA 80.

C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

3.2 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 ft straight edge.

3.3 ADJUSTING

A. Adjust operating assemblies for smooth and noiseless operation.

END OF SECTION

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SECTION 08 44 13

GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum-framed curtain wall, with vision glazing and glass infill panels.

1.2 RELATED REQUIREMENTS

A. Section 05 50 00 - Metal Fabrications: Steel attachment devices.

B. Section 07 25 00 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.

C. Section 07 92 00 - Joint Sealants: Sealing joints between frames and adjacent construction.

D. Section 08 42 29 - Automatic Entrances.

E. Section 08 80 00 - Glazing.

1.3 SUBMITTALS

A. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, internal drainage details, glazing, and infill.

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.

C. Samples: Submit two metal samples 2 by 3 inches in size illustrating finished aluminum surface, glazing, infill panels, and glazing materials.

D. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

E. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations; include load calculations at points of attachment to building structure.

F. Test Reports: Submit results of full-size mock-up testing. Reports of tests previously performed on the same design are acceptable.

G. Field Quality Control Submittals: Report of field testing for water leakage.

H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.4 QUALITY ASSURANCE

A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of Wisconsin.

B. Manufacturer and Installer Qualifications: Company specializing in manufacturing aluminum glazing systems with minimum five years of documented experience.

1.5 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.

1.6 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.

1.7 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.

C. Provide two year Installer weathertightness warranty.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN

A. Pressure Cap at Horizontals with Two (2)-Sided Structural Sealant Glazing (SSG) at Verticals (2nd Floor) and Pressure Capt at Verticals with Two (2)-Sided Structural Sealant Glazing (SSG) at Horizontals (1st Floor); Not Unitized, Field Assembled:

1. Basis of Design: EFCO, a Pella Company; 5600, 2-1/4 inch wide face, depth as indicated on drawings.

B. Other Manufacturers: Provide either product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below.

1. Oldcastle Building Envelope; Reliance: www.obe.com

2.2 CURTAIN WALL

A. Aluminum-Framed Curtain Wall: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.

1. Fabrication Method: Either shop/factory or field fabricated system.
2. Glazing Method: Either shop/factory or field glazed system.
3. Provide flush joints and corners, weathersealed, accurately fitted and secured; prepared to receive anchors; 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.

B. Structural Performance Requirements: Design and size components to withstand the following load requirements without damage or permanent set.

1. Design Wind Loads: Comply with the following:

a. Provide component and cladding design pressure calculations from a Wisconsin licensed professional engineer for an Ultimate Wind Speed of 120 mph, Exposure B. Curtainwall system shall be designed to resist calculated pressures.

b. Measure performance by testing in accordance with ASTM E330/E330M, using test loads equal to 1.5 times the design wind loads and 10 second duration of maximum pressure.

c. Member Deflection: For spans less than 13 feet 6 inches, limit member deflection to flexure limit of glass in any direction, and maximum of 1/175 of span or 3/4 inch, whichever is less and with full recovery of glazing materials.

d. Member Deflection: For spans over 13 feet 6 inches and less than 40 feet, limit member deflection to flexure limit of glass in any direction, and maximum of 1/240 of span plus 1/4 inch, with full recovery of glazing materials.

2. Movement: Accommodate the following movement without damage to components or deterioration of seals:

a. Expansion and contraction caused by 180 degrees F surface temperature.

b. Expansion and contraction caused by cycling temperature range of 170 degrees F over a 12 hour period.

c. Movement of curtain wall relative to perimeter framing.

d. Deflection of structural support framing, under permanent and dynamic loads.

C. Water Penetration Resistance: No uncontrolled water on indoor face when tested as follows:

1. Test Pressure Differential: 10 psf.

D. Air Leakage: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.

E. Thermal Performance Requirements:

1. Condensation Resistance Factor of Framing: 68, minimum, measured in accordance with AAMA 1503.

2. Overall U-value Including Glazing: 0.46 Btu/(hr sq ft deg F), maximum.

2.3 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. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.

3. Provide splayed vertical members (2-piece) to match angles (radius) indicated on drawings.

B. Clips and Angle Supports:

1. Formed Steel Angle Clips with slotted holes for bolt fasteners.

2. Galvanized steel angle: 16 gage.

C. Glazing: As specified in Section 08 80 00.

2.4 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Structural Steel Sections: ASTM A36/A36M; shop primed.

C. Fasteners: Stainless steel; type as required or recommended by curtain wall manufacturer.

D. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.

E. Concealed Flashings: Sheet aluminum, 26 gage, 0.017 inch minimum thickness.

F. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

G. Glazing Accessories: As specified in Section 08 80 00.

H. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

2.5 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.

1. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil; color and gloss as selected by Architect from manufacturer's full line.

B. Touch-Up Materials: As recommended by coating manufacturer for field application.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install curtain 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. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

H. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.2 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

C. Sealant Space Between Curtain Wall Mullions and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.3 FIELD QUALITY CONTROL

A. Test installed curtain wall for water leakage in accordance with AAMA 501.2.

B. Replace curtain wall components that have failed field testing and retest until performance is satisfactory.

3.4 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.

B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.5 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION

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SECTION 08 63 00

METAL-FRAMED SKYLIGHTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aluminum skylight framing system.

B. Skylight glazing.

C. Fasteners, anchors, reinforcement, and flashings.

1.2 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel Framing: Structural support framing for system.

B. Section 05 50 00 - Metal Fabrications: Fabricated steel attachment devices.

C. Section 07-5323: EPDM Roofing: Roofing system and base flashing at skylight curb.

D. Section 07 62 00 - Sheet Metal Flashing and Trim: Skylight counterflashing.

E. Section 07 92 00 - Joint Sealants: Sealing joints between skylight frames and adjacent construction.

F. Section 08 80 00 - Glazing.

1.3 SUBMITTALS

A. Product Data: Provide manufacturer's specifications, standard details, and installation requirements.

B. Shop Drawings: Indicate framed opening requirements and tolerances, spacing of all members, anticipated deflection under load, affected related work, expansion and contraction joint locations and details, and sizes and locations for field welding.

1. Show field measurements on shop drawings.

C. Design Data: Provide framing member structural and physical characteristics and engineering calculations, and identify dimensional limitations.

1. Submit manufacturer's structural calculations showing sizes of framing members and loads applied to supporting structure based on design loads. Structural calculations shall be prepared by a structural engineer licensed in the State of Wisconsin. Engineer shall have a minimum of five years documented experience in the design of self-supporting, sloped glazed systems.

D. Test Reports: Submit certified test reports from a qualified independent testing agency, indicating skylights comply with specified requirements, based on testing of current products. Submit results from the following tests:

1. Air infiltration: ASTM E283.

2. Water penetration: ASTM E331.

3. Uniform load deflection: ASTM E72 and ASTM E330.

4. Simulated Field Test: ASTM E501.2.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not fewer than ten years of documented experience.

B. Installer Qualifications: Company specializing in performing the type of work specified in this section.

1. Minimum five years of documented experience.
2. Approved by skylight manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's unopened containers and packaging. Store products above the floor and under cover in a clean, dry area until ready for installation.

1.6 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.

1.7 WARRANTY

A. Correct defective work, including leaks, discoloration, failure of seal at insulated glazing units, and excessive thermal or structural movement, within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Metal-Framed Skylights:

1. Basis of Design: Wasco Skylights; Pinnacle 350 Single Pitch: www.wascoskylights.com
2. Oldcastle Building Envelope; BMS-3000 Single Sloped Glazing System: www.obe.com
3. Auburn Sklylights, a Division of Major Industries Inc: www.majorskylights.com

2.2 METAL-FRAMED SKYLIGHTS

A. Metal Framed Skylights: Factory-fabricated, glazed.

1. Frame: Extruded aluminum structural members with integral condensation collection and guttering system thermally separated from exterior pressure bar.
2. Style: Single Slope.
3. Glazing System: Pressure glazing bar system for sloped joints and two (2)-sided structural sealant glazing (SSG) for horizontal joints.
4. Glazing: Laminated Insulating Glass Units.
5. Aluminum Finish: Class I color anodized.
6. Fabricate to prevent harmonic vibration, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.

2.3 MATERIALS

A. Aluminum Extrusions: Alloy 6063-T5, 6063-T6, or 6061-T6 members complying with ASTM B221 (ASTM B221M), with minimum thickness 1/8 inch for structural members and 1/16 inch for non-structural members.

B. Formed Aluminum: Sheet material of alloy 5052, 5005, or 6061-T651 members complying with ASTM B209 (ASTM B209M), with minimum thickness 1/8 inch for structural members and 1/16 inch for non-structural members.

C. Internal Reinforcement: ASTM A36/A36M; steel shapes as required for strength and mullion size limitations, hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.

D. Insulating Glass: Sealed insulated units, outer pane of clear transparent, tempered glass; inner pane of clear transparent, laminated glass; space of sealed air, metal edge frame.

E. Weatherseal Sealant: Silicone, with adhesion in compliance with ASTM C794; compatible with glazing accessories.

F. Touch-Up Primer for Galvanized Steel Surfaces: Zinc rich type.

G. Protective Back Coating: Asphaltic mastic, ASTM D4479/D4479M Type I.

H. Fasteners:

1. Framing Connections: As required by connection.
    a. Aluminum: ASTM B211, Alloy 2024-T4.
    b. Stainless Steel: ASTM A193, Series B8 300.
    c. Aluminum Rivets: ASTM B 316.
2. Exterior Cap Retainers: Stainless steel screws, ASTM A193, Series B8 300.
    a. Exposed fastener head finish to match aluminum finish.

I. Flashing: Matching finish of skylight frame system components; secure using concealed fastening method, and seal with weather sealing type sealant.

1. Aluminum sheet, 0.040 inch minimum thickness.

2.4 FABRICATION

A. Rigidly fit and secure joints and corners with screw and spline. Make joints rigid, with connections that are flush, hairline, and weatherproof.

B. Fabricate components to allow for expansion and contraction with minimum clearance and shim spacing around perimeter of assembly.

C. Drain to exterior any water entering exterior joints, condensation occurring in glazing channels, or migrating moisture occurring within system.

D. Prepare components to receive concealed anchorage devices. Ensure that fasteners and anchorage devices will be concealed upon completion of installation.

2.5 FINISHES

A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick; both interior and exterior surfaces.

B. Color: Medium Bronze to match curtainwall framing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that structural curb is ready to receive skylight system. Coordinate installation of roofing and other adjacent work to ensure weathertight construction.

3.2 PREPARATION

A. Apply 1 coat of protective coating to concealed aluminum and steel surfaces in contact with dissimilar materials.

3.3 INSTALLATION

A. Install metal-framed skylights in accordance with manufacturer's instructions.

B. Set skylight structure plumb, level, and true to line, without warp or rack of frames or glazing panels. Anchor securely in place in accordance with approved shop drawings.

C. Maintain assembly dimensional tolerances, aligning with adjacent work.

D. Install base flashings in accordance with Section 07 62 00.

E. Touch up damaged finishes so repair is imperceptible from 6 feet. Remove and replace components that cannot be satisfactorily touched up.

3.4 TOLERANCES

A. Maximum Variation from Plumb, Level, or Line: 1/8 inch per 10 feet, or 3/8 inch total in overall dimension.

B. Alignment of Two Adjoining Members Abutting in Plane: Within 1/16 inches.

3.5 CLEANING

A. Remove protective material from prefinished aluminum surfaces.

B. Wash down exposed surfaces; wipe surfaces clean.

C. Remove excess sealant by methods recommended by skylight manufacturer.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Door hardware for hollow metal, wood, aluminum doors.

B. Hardware for aluminum doors, except weatherstripping, is furnished in Section 08-7100 for installation in Section 08-4413.

1.2 RELATED WORK

A. Electrical: Electrical boxes for door opener push plates, card readers, electrical service, and final connections.

1.3 SUBMITTALS

A. Manufacture's Product Data.

B. The finish hardware supplier shall, prior to ordering and/or delivering, prepare and submit to Architect within ten days after award of contract a electronic PDF detailed, vertical type hardware schedule. Format as recommended by the Door and Hardware Institute (DHI).

C. Wiring diagrams for each opening requiring electrified hardware. Submit with opening schedule, and submit revised final diagrams at time of hardware delivery to jobsite.

1. Riser diagrams, including all electrical components, wire gauge, and wire runs.
2. Point-to-point wiring diagrams indicating detailed interface between electrified hardware, fire alarm system, and security system. Indicate factory-installed and field-installed wiring.
3. Detailed operation narrative describing how opening is to function at rest, from secured side and from egress side. Indicate special requirements such as day-night mode.

D. Documentation of UL 10C, NFPA 252, or other approved test verifying hardware complies with IBC 2012.

E. Keying schedule for review based on an approved hardware schedule and meeting with the Owner.

1. A preliminary planning meeting shall be set three months before the building is occupied to determine keying system requirements. Meeting shall include a representative of the building occupant(s), representative from the Facilities Management Locksmithing Shop, and a representative the Hardware Supplier Certified Key System Specialist.
2. Administrative documents should be reviewed and executed at this meeting
3. Provide a keying schedule with keying designations conforming to Door and Hardware Institute document “Keying Systems and Nomenclature” prior to ordering permanent cores.
4. Submit 1 copy to architect for information only.
5. Submit a letter of compliance, indicating when this meeting was held and who was in attendance, to the Architect, Owner and supplier.

F. Samples when requested for approval, in specified finish.

G. Furnish templates and approved hardware schedule to door and frame fabricators.

1.4 QUALITY ASSURANCE

A. Meet with the Owner to confirm keying requirements.

B. Prepare opening schedules under direct supervision of a registered Architectural Hardware Consultant (AHC).

C. For rated openings, provide hardware of the same or greater rating, listed by Underwriters Laboratories, Warnock-Hersey, or other independent testing agency acceptable to the Owner.

D. For fire-rated openings, provide only hardware that complies with IBC and other applicable codes.

E. Comply with applicable provisions of the following.

1. BHMA - Recommended Locations for Builders' Hardware.
2. NFPA 80 - Standards for Fire Doors and Windows.
3. NFPA 101 - Code for Safety to Life From Fire in Buildings and Structures.
4. UL - Building Material Directory.
5. State Building Code.
6. International Building Code (IBC).

F. Provide all hardware required by applicable regulations.

1.5 PRE-INSTALLATION MEETING

A. Schedule a hardware pre-installation meeting at the site to discuss the following.

1. Installation manuals.
2. Hardware schedule. Demonstrate the function/type of each lockset scheduled and verify function at each door.
3. Electrical Operation: Verify function of all openings requiring electrified hardware. In addition to Owner, Contractor, Architect; conference participants shall also include Hardware Supplier’s Architectural Hardware Consultant, Electrical contractor, Low Voltage contractor, Access Control System provider and related subs. Meeting shall result in all parties understanding of the functionality of others systems, interfacing between products and systems, requirements for wiring, power requirements, etc. Operation narratives have been provided in the hardware groups for reference and as an understanding of the desired function at each door. All involved parties shall provide preliminary Riser Diagrams of their respective systems and review if and how these systems interface. Results of any deviations from hardware specified shall clearly be indicate on submittals and why the additional or deviated hardware is required.
4. Any material that is ordered, and will not fit on doors and frames, will not function as desired based on the required operation of each opening and is required for the intended use, such material shall be removed and replaced at no additional cost to the owner.
5. Templates.
6. Samples.
7. Installation of locksets, closers, exit devices, continuous hinges, overhead stops.

B. Notify required attendees 7 days in advance.

1. Architect.
2. Owner.
3. Door hardware installers, including low voltage hardware.
4. Manufacturer's representative for locksets, closers, exit devices, continuous hinges, overhead stops, security hardware.

5. Other affected subcontractors and suppliers.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Mark manufacturer's original containers to correspond with the approved hardware schedule for the installation location.

1.7 WARRANTY

A. Furnish manufacturer's warranty to include repair or replacement of deficient materials and workmanship at no additional cost to Owner:

1. Closers: 25 years.
2. Locksets: 5 years.
3. Other hardware: 2 years.

1.8 MAINTENANCE

A. Furnish 2 sets of manufacturer's installation and adjustment tools for each type of hardware.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, PRODUCTS

A. Standards: Product numbers of the indicated manufacturer are used in the hardware groups to establish function and quality.

B. Electrified units: Provide manufacturer's power supply recommended for conditions of use.

C. Where hardware is specified on lead lined doors, provide hardware (locks, closers, throughbots, astragals) with sufficient lead protection to meet the rooms' radiation requirements.

2.2 BUTT HINGES

A. Acceptable products:

Hager	Ives	McKinney
BB1279	5BB1	TB2714
BB1191	5BB1	TB2314
BB1168	5BB1HW	T4B3786
BB1199	5BB1HW	T4B3386

Or equivalent by Bommer, Stanley.

B. Quantities.

1. Doors up to 90 inches tall: 3 per door leaf.
2. Doors over 90 inches tall: One additional hinge per door leaf for every 30 inches of additional height.
3. Dutch doors: 2 per door leaf.

C. Weight, bearing type: Unless noted otherwise in Hardware Groups.

1. Interior opening 36 inches through 40 inches wide: Heavyweight, ball bearing. Ives 5BB1HW.
2. Interior openings over 40 inches wide: Heavyweight, ball bearing. Ives 5BB1HW.
3. Vestibule doors: Heavyweight, ball bearing. Ives 5BB1HW.
4. Exterior openings: Heavyweight, ball bearing. Ives 5BB1HW.

D. Pins:
   1. Lockable doors opening outward: Non-removable pin (NRP).
   2. Other doors: Non-rising pins.

E. Size: 4-1/2 inches by 4-1/2 inches, except wider as required to clear trim and allow full 180 degree swing.

F. Tips: Flat bottom unless otherwise noted in hardware groups.

2.3 FLUSH BOLTS AND DUST PROOF STRIKES

A. Acceptable flush bolts:

Ives	DCI	Hager	Trimco	Rockwood
FB458	780	282D	3915	555
FB31P	842	292D	3810	1842
FB41P	942	291D	3815	3815
FB51P	845	293D	3820	2849
FB61P	945	294D	3825	1945

B. Dustproof strikes: One for each bottom bolt. Ives DP-2, Door Controls 82, Hager 280X DP-2, Trimco 3910, Rockwood 570.

2.4 EXIT DEVICES

A. Latch bolts: Deadlocking.

B. Surface strikes: Roller unless otherwise indicated.

C. Fasteners: Through bolts. Back fasteners not visible through full glass doors.

D. Lever trim: Vandal-resistant; match design of locksets.

Von Duprin	Detex	Falcon
99 Series	Advantex	24/25 Series

2.5 LOCKS AND LATCHES

A. Backset: 2-3/4 inches.

B. Strikes: Lip length sufficient to protect trim, frame, inactive leaf.
   1. Hollow metal doors and frames: ANSI A115.2.
   2. Pairs of wood doors and wood frames: Wrought box for inactive leaf.

Schlage	Best	Falcon
ND Series	9T3 Series	T Series

2.7 ACCESS CONTROL SYSTEMS

A. Access Control System and all necessary equipment to properly operate security door hardware to be provide by owner.

B. Interfacing of this equipment with hardware specified in this section shall be the responsibility of the Access Control System Supplier.

2.8 PULLS, PUSH BARS, PUSH/PULL PLATES

A. Acceptable manufacturers: Burns, Hager, Ives, Rockwood, Trimco.

B. Mounting, push bars and pulls: Back to back, shoulder bolts and set screws; set screws on inside.

2.9 COORDINATORS

A. Acceptable equivalent products: Ives COR/FL, Door Controls 600, Hager 297D, Trimco 3094, Rockwood 2600 others as approved.

B. Locations: One for each labeled pairs of doors equipped with automatic flush bolts, and for each vertical rod/mortise lock fire exit device combination with overlapping astragals.

C. Filler bars: Length to fill opening width, closer mounting brackets, carry bars, and special preparation for top latches where applicable.

2.10 CLOSERS

A. Operation, interior doors: Low opening force per ADA and ANSI 117.

B. Construction: High strength cast iron cylinders.

C. Fluid: Stable within temperature range of minus 30 to plus 120 degrees F.

D. Accessories: Mounting brackets, drop plates, special shoes, through bolts as required by door and frame conditions. Parallel rigid arms on exterior doors.

E. Installation location: Room side of corridor doors, stair side of stairways, interior side of exterior doors.

LCN	Norton	Sargent
4011/4111 Series	9500 Series	281 Series

2.12 KICK PLATES, ARMOR PLATES

A. Acceptable manufacturers: Burns, Hager, Hiawatha, Ives, Rockwood, Trimco.

B. Material: 0.050 inch thick stainless steel.

C. Kick plates: 12 inches tall, 2 inches less than door width. Countersunk fastener holes, beveled 4 edges.

2.13 OVERHEAD STOPS

A. Acceptable equivalent products:

Glynn-Johnson	Rixson	Sargent
GJ90 Series	9 Series	590
GJ100 Series	1 Series	690

B. Accessories: Sex bolt attachments for mineral core doors without reinforcing blocks.

2.14 WALL STOPS AND HOLDERS

A. Acceptable equivalent products:

Ives	Hager	Burns	Trimco	Rockwood
WS407CVX	232W	570	1270WXCP	406
WS407CCV	236W	575	1270WVCP	409
WS11X	255W	530	1205	518
WS40	254W	533	1254	490

2.16 WEATHERSTRIP, THRESHOLDS, DOOR BOTTOMS, GASKETING

A. Acceptable equivalent products:

		Zero	NGP	Reese
1.	Threshold:	625A	425E	S205A
2.	Weatherstrip:	328AA/429A	700NA	755A
3.	Drip cap:	142A	16A	R201A
4.	Sweeps:	39A	B606A	964A

B. Install weather strip prior to other surface hardware such as door closers, exit devices etc.. Supplier to ensure proper templating of surface hardware allowing for the thickness of the weatherstrip.

D. Head, jamb gasket: Coordinate with door manufacturer intumescent fire and smoke material to comply with UL 10C, UBC test 7-2. Provide at each labeled opening. Zero 188S, NGP 2525, Reese 797B.

2.17 ELECTROMECHANICAL HARDWARE

A. The electrical products contained within this specification represent a complete engineered system. If alternate electrical products are submitted, it is the responsibility of the supplier to bear the cost of providing a complete and working system including re-engineering of electrical diagrams and system layout, as well as power supplies, power transfers and all required electrical components. Coordinate with electrical engineer and electrician to ensure that line voltage and low voltage wiring is coordinated to provide a complete and working system.

B. Where Electrified functions are specified, provide manufacturer's recommended power supply that is filtered and regulated; and listed and labeled for use with fire alarm systems, with power sufficient to operate electrified function specified.

C. Electrical: Electrical boxes in walls, electrical service, conductors and final connections provided under Division 26:

2.19 BASE MATERIALS AND FINISHES

A. Except where indicated otherwise in the hardware groups or herein, hardware finishes shall be applied over base metals as specified in the finish schedule that follows.

B. Provide locks, latches, push/ pull hardware and panic exit hardware with a FDA recognized Anti-Microbial coating with built-in protection to prevent the growth of a broad range of bacteria, mold and mildew.

1. Butt hinges.
    a. Exterior: US32D, BHMA 630.
    b. Interior: US26D, BHMA 626 or 652.
2. Exit devices: US26D with US32D touchpad.
3. Locks and latches: US26D, BHMA 626.
4. Pulls and push bars: US32D, BHMA 630.
5. Closers: Powder coated aluminum, BHMA 689.
6. Protective plates: US32D, BHMA 630.
7. Overhead stops: US32D, BHMA 630.
8. Wall stops and holders: US26D or US32D; BHMA 626 or BHMA 630.
9. Miscellaneous: US26D on brass or bronze, BHMA 626.

2.20 KEYING

A. System: Key locksets and cylinders into master key system as required by Owner's representative.

B. System: Provide 6 pin interchangeable core master key system for exit devices. Provide fixed core cylinders everywhere else unless listed differently in sets.

C. Keys: 3 change keys each lock, 6 master keys each set, 6 grand master keys and 3 control keys for IC cylinders. 2 Construction control keys and 20 construction keys.

D. Construction cylinders: Provide 10 keyed construction cylinders for use to secure openings during construction.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use only fasteners supplied by or recommended by manufacturer.

B. Set units level, plumb, true to the line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

C. Comply with manufacturer's requirements to maintain UL labels.

D. Comply with supplemental "S" label instructions on fire rated openings.

E. Apply self-adhesive gasket on frame stop at head and latch side, on frame rabbet at hinge side.

F. Mortise and cut to close tolerance; conceal evidence of cutting in finished work.

G. Drill countersink holes in units that are not factory-prepared for fasteners.

H. Do not mount wall stops on casework, cabinet work, equipment.

1. Install at BHMA recommended mounting locations.
2. Install wall stops to engage levers and pulls.

3.2 QUALITY CONTROL

A. The hardware supplier and manufacturer's representatives for locksets, closers, exit devices, and overhead stops shall visit the site after hardware has been installed, and shall submit a list of hardware that has not been installed correctly.

B. After hardware installation is complete, the hardware supplier and manufacturer's representative shall meet with the Owner to explain the functions, uses, adjustment, and maintenance of each type of hardware installed.

3.3 ADJUSTMENT AND CLEANING

A. At final completion, adjust, lubricate, and verify proper operation of each operating item of hardware and each door.

B. Provide new hardware to replace items that cannot be adjusted to operate freely and smoothly.

C. Clean and restore hardware to original finish.

3.4 HARDWARE SCHEDULE

Hardware Group No. 01

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
8	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
2	EA	PANIC HARDWARE	CD-9949-L-06	626	VON
2	EA	RIM CYLINDER	20-057	626	SCH
2	EA	MORTISE CYLINDER	20-061 XQ11-948	626	SCH
2	EA	OH STOP	100S	630	GLY
1	EA	SURF. AUTO OPERATOR	9563 REG2 MS	ANCLR	LCN
1	EA	ACTUATOR PKG WALL MT	8310-3822TW	630	LCN
2	EA	MEETING STILE	8193AA	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	625A-MSLA-10	A	ZER

Perimeter weatherstripping by aluminum door supplier.

Auto-operator will need to be manually switched on/off. Door will need to be manually locked or unlocked.

Power for the auto-operator is by the electrical contractor.

Hardware Group No. 02

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
8	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	2 PT DEADLATCH	4781 X 8655 TALL DR KIT	628	ADA
1	EA	2 PT DEADLATCH	4781 X 8655 TALL DR KIT X 8650 CYLINDER ESCUTCHEON	628	ADA
1	EA	MORTISE CYLINDER	20-062	626	SCH
2	SET	PUSH/PULL BAR	9190HD-10"-NS	630	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
2	EA	MEETING STILE	8193AA	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	625A-MSLA-10	A	ZER
2	EA	DOOR CONTACT	679-05HM	BLK	SCE

Perimeter weatherstripping by aluminum door supplier.

Monitoring of the door position switch is by the security system provider.

Hardware Group No. 03

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL STOREROOM LOCK	ND96PD RHO	626	SCH
1	EA	ELECTRIC STRIKE	6223 FSE	630	VON
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4111 SHCUSH	689	LCN
2	EA	ARMOR PLATE	8400 36" X 1" LDW B-CS	630	IVE
2	EA	LOCK EDGE GUARD	DES-5C 36"	630	HIA
2	EA	HINGE EDGE GUARD	DES-5C 36"	630	HIA
1	EA	GASKETING	328AA	AA	ZER
1	EA	GASKETING	429A	A	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-MSLA-10	A	ZER
1	EA	RAIN DRIP	142A	A	ZER
2	EA	DOOR CONTACT	679-05HM	BLK	SCE

Mount 429A head seal prior to mounting closers.

Credential reader device, required power and wiring to the electric strike and the door position switch is by the security system provider.

Hardware Group No. 04

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	VANDL STOREROOM LOCK	ND96PD 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	328AA	AA	ZER
1	EA	GASKETING	429A	A	ZER
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	65A-MSLA-10	A	ZER
1	EA	RAIN DRIP	142A	A	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

Mount 429A head seal prior to mounting closer.

Monitoring of the door position switch is by the security system provider.

Hardware Group No. 05

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	FIRE EXIT HARDWARE	9949-L-F-06	626	VON
2	EA	RIM CYLINDER	20-057	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	188S-BK	S-Bk	ZER
2	EA	MEETING STILE	328AA	AA	ZER
2	EA	DOOR CONTACT	679-05HM	BLK	SCE

Monitoring of the door position switch is by the security system provider.

Hardware Group No. 06

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	99-L-BE-06	626	VON
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	4011 ST-1544	689	LCN
1	EA	MOUNTING PLATE	4020-18	689	LCN
1	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	625A-MSLA-10	A	ZER

Hardware Group No. 07

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
8	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
2	SET	PUSH/PULL BAR	9103EZHD-10"-NS	630	IVE
2	EA	OH STOP	100S	630	GLY
1	EA	SURF. AUTO OPERATOR	9563 REG2 MS	ANCLR	LCN
1	EA	ACTUATOR PKG WALL MT	8310-3822TW	630	LCN
2	EA	MEETING STILE	8193AA	AA	ZER

2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	625A-MSLA-10	A	ZER

Power for the auto-operator is by the electrical contractor.

Hardware Group No. 08

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
8	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
2	SET	PUSH/PULL BAR	9103EZHD-10"-NS	630	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4011 ST-1544	689	LCN
2	EA	MOUNTING PLATE	4020-18	689	LCN
2	EA	MEETING STILE	8193AA	AA	ZER
2	EA	DOOR SWEEP	39A	A	ZER
1	EA	THRESHOLD	625A-MSLA-10	A	ZER

Hardware Group No. 09

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4111 EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER
1	EA	GASKETING	139A	A	ZER
2	EA	DOOR CONTACT	679-05HM	BLK	SCE

Monitoring of the door position switch is by the security system provider.

Hardware Group No. 10

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MOUNTING BRACKET	MB	689	IVE
2	EA	SURFACE CLOSER	4111 EDA	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER
1	EA	GASKETING	139A	A	ZER

Hardware Group No. 11

Provide each PR door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	VANDL STOREROOM LOCK	ND96PD RHO	626	SCH
1	EA	ELECTRIC STRIKE	6223 FSE	630	VON
1	EA	OH STOP & HOLDER	90F	630	GLY
1	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4011 H	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER
1	EA	GASKETING	139A	A	ZER
2	EA	DOOR CONTACT	679-05HM	BLK	SCE

Credential reader device, required power and wiring to the electric strike and the door position switch is by the security system provider.

Hardware Group No. 12

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE	630	VON
1	EA	SURFACE CLOSER	4111 EDA	689	LCN

1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

Credential reader device, required power and wiring to the electric strike and the door position switch is by the security system provider.

Hardware Group No. 13

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE	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	188S-BK	S-Bk	ZER
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

Credential reader device, required power and wiring to the electric strike and the door position switch is by the security system provider.

Hardware Group No. 14

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
4	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80PD 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	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER

Hardware Group No. 15

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
4	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	SURFACE CLOSER	4111 EDA	689	LCN

1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER

Hardware Group No. 16

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	SURFACE CLOSER	4011 H	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER

Hardware Group No. 17

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	PASSAGE SET	ND10S 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	WS406/407CVX	630	IVE
1	EA	GASKETING	188S-BK	S-Bk	ZER

Prep door with raceway for future electrified lock.

Hardware Group No. 18

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE

Hardware Group No. 19

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	STOREROOM LOCK	ND80PD RHO	626	SCH
1	EA	OH STOP & HOLDER	90F	630	GLY
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE

Hardware Group No. 20

Provide each SGL door(s) with the following:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PRIVACY LOCK	ND40S RHO	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CVX	630	IVE

Hardware Group No. 21

Provide each SGL door(s) with the following:

All hardware by door manufacturer.

END OF SECTION

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SECTION 08 71 15

LOW-ENERGY AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Low energy automatic swing door operators, push plate operators.

1.2 RELATED WORK

A. Electrical: 115 VAC, single-phase, 15 amp fused circuit to door headers, two 24 VAC Class II wires between door headers and remote activation devices, 1/2 inch conduit and electrical boxes at activators. Low voltage wiring for fire, security, and alarm systems, and for other electrified hardware affecting door operation.

1.3 SUBMITTALS

A. Manufacturer's Product Data.

B. Shop Drawings showing dimensions of operators, interface with other products, operator construction, modifications, connections, and anchorage.

C. Operating and maintenance instructions, parts lists, and wiring diagrams.

D. American Association of Automatic Door Manufacturers (AAADM) certification that operator has been installed and inspected to comply with applicable ANSI standards.

1.4 QUALITY ASSURANCE

A. Installer qualifications: Factory-trained, with 3 years experience, AAADM certified. Approved by manufacturer.

B. Door operators and installation shall conform to ANSI 156.19 "Power Assist and Low Energy Power Operated Doors".

PART 2 - PRODUCTS

2.1 MANUFACTURERS

2.2 ACCEPTABLE MANUFACTURERS:

A. Horton Automatics: www.hortondoors.com

B. LCN: us.allegion.com

C. Stanley Access Technologies: www.stanleyaccess.com

D. Other as approved.

2.3 OPERATION

A. Operation: Push button, push plate, switch-activated, or manual opening, with power boost closing and holding; comply with ANSI A156.19 and UL 325.

1. Opening: Open to 90 degrees, maintaining engagement of operating mechanism through opening cycle.

2. Closing: Close and center door against stop after each cycle and hold against drafts, winds, and stack pressure. Act as manual closer when not powered.
3. Closing force: As required to close and latch.

B. Adjustment: Microprocessor control for:
1. Opening speed.
2. Back check.
3. Hold open, from 5 to 30 seconds.
4. Closing speed.
5. Opening force (torque limiting).
6. Acceleration during opening and recycling, for soft start.

C. Equipment:
1. Control box and motor/gear box: Contained in aluminum housing; precision-machined gears and bearing seats and all-weather lubricant.
2. Terminal strip: In enclosed box above door, indicating connections for fire and security alarm equipment, and other electrified hardware associated with door operation.
3. Motor: DC permanent magnet motor with shielded ball bearings. Stop motor when door stops or is fully open and when break-away is operated.
4. Door operating arm: Forged steel, attached at natural pivot point of door. Exposed arms: Factory polished and finished to match operator enclosure.
5. Control circuits for actuators and safeties: Low voltage, NEC Class II.
6. Service conditions: Minus 30 degrees F to 160 degrees F.
7. Power supply required: 115 VAC.
8. Manual "On-Off-Hold Open" switch.

D. Enclosure: Concealing all operating parts except arms and manual control switches. Access door for access to controls and removable components without removal of door or operator. No exposed fasteners.

2.4 OPERATING CONTROLS

A. Wall-mounted push button switch: No. 1204-900; 2 required per opening.

B. Push plate (PP): Formed stainless steel plate, satin finish; approximately 5 inches square with depressed marking; 2 required per opening. Marking: Handicapped symbol, filled blue.

C. Bollard post: 6 inches by 6 inches aluminum post with concealed bottom mounting bracket, 42 inches tall, to accommodate single gang push plate activation device located at 36 inches from finished floor surface. Provide HDPE mortised removable cap, black color.
1. Basis-of-Design: Curran Engineering Company, Inc; CE-916-635-C: www.curranengineering.com
2. Other Manufacturers:
a. Security Door Controls; BPS6: www.sdcsecurity.com
3. Finish: Clear Anodized or Metallic Silver (Clear) Powder Coat.

D. Aluminum finish: Match color of aluminum storefront entry system.

2.5 FINISHES

A. Exposed aluminum: Clear anodized, AAMA 611-98, Class I, AA-M12C22A41, clear coating 0.018 mm minimum.

2.6 MARKINGS

A. Decals: Visible from either side, instructing the user as to the operation and function of the door.

B. Service label: Sticker or plate on operator, showing installer and contact information for service.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify that electrical connections are made correctly, with dedicated grounding.

B. Adjust door operators for proper operation, without binding or scraping and without excessive noise.

C. Clean glass.

D. Furnish AAADM Certified Daily Safety Check.

3.2 SCHEDULES

A. Exterior doors, Vestibule Doors and Interior doors

1. Horton 4000 HD-Swing.
2. LCN 9300 Series Astro Swing.
3. Stanley Magic Force.

END OF SECTION

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SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glass.

B. Glazing compounds and accessories.

1.2 RELATED REQUIREMENTS

A. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.

B. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

C. Section 08 14 16 - FLUSH WOOD DOORS: Glazed lites in doors.

D. Section 08 42 29 - Automatic Entrances: Glazing furnished as part of door assembly.

E. Section 08 44 13 - Glazed Aluminum Curtain Walls: Glazing furnished by wall manufacturer.

1.3 SUBMITTALS

A. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, special handling or installation requirements.

B. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

1.4 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and GANA Sealant Manual for glazing installation methods.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

1.5 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.6 WARRANTY

A. Sealed Insulating Glass Units: Provide a ten (10) year warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN - INSULATING GLASS UNITS

A. SG-1 Sealed Insulating Glass Units: Vision glazing, with Low-E coating.

1. Application: All exterior glazing unless otherwise indicated.
2. Between-lite space filled with argon.
3. Thermal Resistance (U-Value): 0.30, nominal.

4. Total Solar Heat Gain Coefficient: 0.29, nominal.
5. Total Visible Light Transmittance: 37 percent to 39 percent.
6. Basis of Design: Viracon, Inc VE1-45
7. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
   a. Tint: Clear.
   b. Low-E Coating: Coating on #2 surface..
8. Inboard Lite: Annealed float glass, 1/4 inch thick.
   a. Tint: Clear.
9. Total Thickness: 1 inch.

B. SG-1A: Same as SG-1, except with fully tempered safety glazing lites.

C. SG-4 Sealed Laminated Insulating Glass Units: Vision glazing, with Low-E coating.
1. Application: Skylights and View lites at exterior hollow metal doors.
2. Between-lite space filled with air.
3. Thermal Resistance (U-Value): 0.29, nominal.
4. Total Solar Heat Gain Coefficient: 0.28, nominal.
5. Total Visible Light Transmittance: 35 percent to 38 percent.
6. Basis of Design: Viracon, Inc VE1-45
7. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
   a. Tint: Clear.
   b. Low-E Coating: Coating on #2 surface.
8. Inboard Lite: Laminated fully tempered float glass, 030 PVB clear interlayer, 5/16 inch thick overall.
   a. Tint: Clear.
   b. Low-E Coating: Coating on #2 surface.
9. Total Thickness: 1-1/16 inch.

2.2 GLAZING UNITS

A. FG-1 Single Vision Glazing:
1. Application: Non-rated, non-safety locations.
2. Type: Annealed float glass.
3. Tint: Clear.
4. Thickness: 1/4 inch.

B. FG-2 - Single Safety Glazing: Non-fire-rated.
1. Application: All interior glazing unless otherwise indicated.
   a. Glazed lites in doors, except fire doors.
   b. Glazed side lites to doors, except in fire-rated walls and partitions.
   c. Glazed view windows and panels in partitions enclosing activity rooms, except in fire-rated walls and partitions.
   d. Glazing panels listed in Chapter 24 of IBC 2012.

C. FG-4 - Fire-rated safety glazing: Tempered glazing with partial radiant heat protection.
   1. IBC Fire Protection Rating: To meet wall opening rating requirements of Table 716.5 (IBC 2012).
   2. Safety Certification: 16 CRF 1201: Safety Standard for Architectural Glazing Materials.
   3. Application: Provide this type of glazing in rated interior construction, rated doors and rated windows/sidelites.
   4. Basis of Design: SAFTI*FIRST*; SuperLite I-XL: www.safti.com
   5. Thickness: 1/4 inch.

D. FG-5 - Fire-rated safety glazing: Tempered glazing with partial radiant heat protection.
   1. IBC Fire Protection Rating: To meet wall opening rating requirements of Table 716.5 (IBC 2012).
   2. Safety Certification: 16 CFR 1201: Safety Standard for Architectural Glazing Materials.
   3. Application: Provide this type of glazing in interior construction, rated doors and rated windows/sidelites.
   4. Basis of Design: SAFTI*FIRST*; SuperLite X-45/60/90: www.safti.com
   5. Thickness: 3/4 inch.

2.3 EXTERIOR GLAZING ASSEMBLIES

A. Performance Criteria: Select type and thickness of glass to withstand dead and live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Design Pressures as indicated on General Structural Notes drawing sheet.
   2. Glass thicknesses listed are minimum.

2.4 GLASS MATERIALS

A. Float Glass: All glazing is to be float glass unless otherwise indicated.
   1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
   2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
   3. Tinted Types: Color and performance characteristics as indicated.
   4. Thicknesses: As indicated; for exterior glazing comply with specified requirements for wind load design regardless of specified thickness.

2.5 SEALED INSULATING GLASS UNITS

A. Sealed Insulating Glass Units: Types as indicated.
   1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
   2. Edge Spacers: Warm edge, bent and soldered corners.
   3. Edge Seal: Glass to elastomer with supplementary silicone sealant.
   4. Edge Seal Color: Black.
   5. Purge interpane space with dry hermetic air.

2.6 GLAZING ACCESSORIES

A. Setting Blocks: Neoprene, 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 x width of glazing rabbet space minus 1/16 inch x 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 x one half the height of the glazing stop x 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; hardness range of 5 to 30 cured Shore A durometer; coiled on release paper; black color.

D. Glazing Gaskets: Resilient EPDM extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; Black color.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with manufacturer's instructions.

3.2 INSTALLATION - EXTERIOR/INTERIOR DRY METHOD (GASKET GLAZING)

A. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

B. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.

C. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

3.3 CLEANING

A. Remove glazing materials from finish surfaces.

B. Clean glass and adjacent surfaces.

END OF SECTION

SECTION 08 91 00

LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Louvers, frames, and accessories.

1.2 SUBMITTALS

A. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

B. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.

C. Test Reports: Independent agency reports showing compliance with specified performance criteria.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum ten years of documented experience.

1.4 WARRANTY

A. Provide twenty year manufacturer warranty against distortion, metal degradation, and failure of connections.

1. Finish: Include coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wall Louvers:

1. Basis of Design: American Warming and Ventilating; LE-31: www.awv.com

B. Other acceptable manufacturers:

1. Airolite Company, LLC: www.airolite.com
2. Construction Specialties, Inc: www.c-sgroup.com
3. Industrial Louvers, Inc: www.industriallouvers.com

2.2 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.

1. Wind Load Resistance: Design to resist positive and negative wind load pressures as indicated under the Components and Cladding Pressures located on the General Structural Notes drawing sheet.
2. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.

3. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
4. Screens: Provide bird screens at intake louvers and bird screens at exhaust louvers.

B. Stationary Louvers : Horizontal blade, extruded aluminum construction, with intermediate mullions matching frame.

1. Free Area: 50 percent, minimum.
2. Blades: Drainable.
3. Frame: 6 inches deep, channel profile; corner joints mitered and, with continuous recessed caulking channel each side.
4. Aluminum Thickness: Frame 12 gage, 0.0808 inch minimum; blades 12 gage, 0.0808 inch minimum.
5. Aluminum Finish: Superior performing organic coatings; finish welded units after fabrication.

2.3 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M), .

B. Bird Screen: Interwoven wire mesh of steel, 0.063 inch diameter wire, 1/2 inch open weave, diagonal design.

2.4 FINISHES

A. Superior Performing Organic Coatings: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system.

1. Polyvinylidene fluoride (PVDF) multi-coat thermoplastic fluoropolymer coating system, including minimum 70 percent PVDF color topcoat and minimum total dry film thickness of 0.9 mil; color and gloss as indicated on drawings.

2.5 ACCESSORIES

A. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.

B. Fasteners and Anchors: Stainless steel.

C. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.

D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

D. Secure louver frames in openings with concealed fasteners.

END OF SECTION

Section 09-0601 - Schedule of Interior Materials

CONCRETE

CODE	MANUFACTURER	COLOR	FINISH	NOTES
SLR1	Sealed Concrete			Loading Dock
CONC1	Polished Concrete			Elevator Lobby

CERAMIC TILE 09-3000

CODE	MANUFACTURER	STYLE	COLOR	SIZE(S)	GROUT	NOTES
CT1	Not Used					
CT2	Daltile	Semi-Gloss Wall Tile	Almond 0135	4.25" x 4.25"	TBD	Toilet Wall, provide Wall Bullnose at top of tile (S-4449)
CT3	Daltile	Semi-Gloss Wall Tile	Suede Grey 0182	4.25" x 4.25"	TBD	Toilet Wall; Accent
CTB2	Daltile	Semi-Gloss flat top cove base A-3401	Almond 0135	4.25" x 4.25"	TBD	Base at toilet room tiled walls
CTB3	Daltile	Semi-Gloss sanitary cove base S-3419T	Almond 0135	4.25" x 6"	TBD	Base at toilet room painted walls

RESILIENT

CODE	MANUFACTURER	STYLE	COLOR	NOTES
RF1	Nora	Norament Satura ; 6x6	5115 Hercules	
VCT	Armstrong	Imperial texture, Standard Excelon	51858 Sandrfit White	

RESILIENT BASE 09-6500

CODE	MANUFACTURER	STYLE	COLOR	NOTES
RB1	Johnsonite	4" high vinyl	Grey 48	
SSTB	Stainless Steel Base			

FLOORING TRANSITIONS 09-3000, 09-6500, 09-6800

CODE	MANUFACTURER	STYLE	COLOR/FINISH	NOTES
TS1	Not Used			
TS2	Johnsonite	Reducer, SSR - XX-B	Grey 48	Verify, material thickness with strip identified in schedule
TS3	Schluter	Schluter Scheine	Stainless Steel	All tile terminations at CT1

PAINT 09-9100

CODE	MANUFACTURER	COLOR	NOTES
PNT1/ HPNT1	Sherwin Williams	Extra White SW7006	Field
PNT2	Sherwin Williams	Agreeable Grey SW7029	Accent - Light Tan
PNT3	Glidden	Charcoal Slate #30BB 71/014	Accent - Dark Grey
PNT4	Not Used		
PNT5	Sherwin Williams	SW2837 Aurora Brown	Accent - Red Elevator Surround
PNT6	Sherwin Williams	SW2840 Hammered Silver	Accent - Dark Tan

WALL PROTECTION

CODE	MANUFACTURER	COLOR	Thickness	NOTES

PWC1	Inpro Corp	Feather 0238	0.6	Butt joint at seams, With Silicone Bead. Trim at top only.

END OF SCHEDULE

SECTION 09 21 16

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.
B. Metal stud wall framing.
C. Metal backing plate.
D. Metal channel ceiling framing.
E. Acoustic insulation.
F. Cementitious backing board.
G. Gypsum wallboard.
H. Joint treatment and accessories.
I. Identification of rated partitions.

1.2 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping: Sealing top-of-wall assemblies and through-wall penetrations at fire rated walls.
B. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.3 SUBMITTALS

A. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.
B. Product Data: Provide data on metal framing, gypsum board, glass mat faced gypsum board, accessories, and joint finishing system.
C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
D. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board application and finishing, with minimum 5 years of documented experience.
B. Comply with ASTM C754 - Installation of steel framing members to receive screw-attached gypsm panel products.
C. Comply with Gypsum Association GA-216 - Application and Finishing of Gypsum Panel Products.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

B. Interior Partitions, Indicated as Acoustic: Provide completed assemblies with the following characteristics:
   1. Acoustic Attenuation: STC as indicated calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

C. Shaft Walls at HVAC Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Sustained loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

D. Shaft Walls at Elevator Shafts: Provide completed assemblies with the following characteristics:
   1. Air Pressure Within Shaft: Intermittent loads of 5 lbf/sq ft with maximum mid-span deflection of L/240.
   2. Acoustic Attenuation: STC of 35-39 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.

E. Fire Rated Assemblies: Provide completed assemblies as indicated in the Drawings.
   1. ICC IBC Item Numbers: Comply with applicable requirements of ICC IBC for the particular assembly.
   2. Gypsum Association File Numbers: Comply with requirements of GA-600 for the particular assembly.
   3. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.2 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:
   1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com
   2. Marino Ware: www.marinoware.com

B. Non-Loadbearing 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 with flat or formed webs with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C-shaped.
   4. Metal Backing Plate: 6 inch, 20 gage.
   5. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
   6. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through one leg only.

C. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05 40 00.

D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.

E. 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 and fastened as indicated on UL Design.

2.3 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. CertainTeed Corporation: www.certainteed.com
   2. Georgia-Pacific Gypsum: www.gpgypsum.com
   3. National Gypsum Company: www.nationalgypsum.com
   4. USG Corporation: www.usg.com

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 ceilings, unless otherwise indicated.
   2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
   3. Unfaced fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
   4. 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.
   5. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   6. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch.
      c. Radiused Walls/Furred Ceiling: 1/4 inch. Two layers. At walls with ratings use 5/8 inch and achieve radius by 'wet bending' board per GA-226-08.
      d. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
   7. Mold Resistant Paper Faced Products:
      a. National Gypsum Company; Gold Bond XP Gypsum Board.
   8. Glass Mat Faced Products:
      a. National Gypsum Company; Gold Bond eXP Interior Extreme Gypsum Panel.
      b. USG Corporation; USG Sheetrock Brand Glass-Mat Panels Mold Tough.

C. Abuse Resistant Wallboard:
   1. Application: High-traffic areas indicated.
   2. Surface Abrasion: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
   3. Soft-body Impact: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
   4. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   5. Type: Fire resistance rated Type X, UL or WH listed.
   6. Thickness: 5/8 inch.
   7. Edges: Tapered.

D. Backing Board For Wet Areas:
   1. Application: Surfaces behind tile in wet areas including toilet rooms.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
      a. Thickness: 5/8 inch.
      b. Products:
         1) National Gypsum Company; PermaBase Cement Board: www.nationalgypsum.com
         2) USG Corporation; Durock Cement Board: www.usg.com
         3) FinPan; Util-A-Crete: www.finpan.com
   4. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
      a. Standard Type: Thickness 5/8 inch.
      b. Fire Resistant Type: Type X core, thickness 5/8 inch.
      c. Products:
         1) Georgia-Pacific Gypsum; DensShield Tile Backer.
         2) National Gypsum Company; Gold Bond eXP Tile Backer.

E. Flexible Gypsum Board:
   1. Application: Radiused wall/furred ceiling surfaces.
   2. Mold Resistance: Score of 10 when tested in accordance with ASTM D3273.
   3. Thickness: 1/4 inch, two layers (or wet bending of 5/8 inch, single layer).
   4. Edge: Slightly tapered.

F. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Ceilings, unless otherwise indicated.
   2. Thickness: 5/8 inch.
   3. Edges: Tapered.

G. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
   1. Application: Exterior sheathing, unless otherwise indicated.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
   4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   5. Core Type: Regular and Type X, as indicated.
   6. Type X Thickness: 5/8 inch.
   7. Regular Board Thickness: 5/8 inch.
   8. Edges: Square.

H. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.

1. Paper Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

2.4 ACCESSORIES

A. Acoustic Insulation: ASTM C665, Type 1; preformed mineral wool, friction fit type, unfaced. Thickness: 3.5 inch.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.
1. Types: As detailed or required for finished appearance.
2. Special Shapes: In addition to conventional corner bead and control joints, provide U-bead at exposed panel edges.

D. Joint Materials: ASTM C475 and as recommended by gypsum board manufacturer for project conditions.
1. Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.

E. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch 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. Vapor Barrier: 4 mil polyethylene, clear sheeting. Provide at partitions where noted.

2.5 IDENTIFICATION OF RATED PARTITIONS

A. General: Provide permanent signs or stencils to identify fire walls, fire barriers, fire partitions, smoke barriers, smoke partitions, and other walls required to have protected openings or penetrations.

B. Letters: Minimum 3 inches tall, minimum 3/8 inch wide strokes.

C. Font: Arial, or other Sans Serif font as approved.

D. Label content "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS".

PART 3 EXECUTION

3.1 SHAFT WALL INSTALLATION

A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.
1. Fasten runners to structure with short leg to finished side, using appropriate power-driven fasteners at not more than 24 inches on center.
2. Install studs at spacing required to meet performance requirements.

B. Shaft Wall Liner: Cut panels to accurate dimension and install sequentially between special friction studs.
1. On walls over sixteen feet high, screw-attach studs to runners top and bottom.

3.2 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Studs: Space studs at 16 inches o.c., unless noted otherwise..

1. Extend partition framing to structure where indicated and to 6 inches above ceiling in other locations.

2. 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.

C. Standard Wall Furring: Install at concrete 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.

D. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.

E. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.

F. Blocking: Install wood blocking or metal backing plate for support of:

1. Framed openings.

2. Wall mounted cabinets.

3. Plumbing fixtures.

4. Toilet partitions.

5. Toilet accessories.

6. Wall mounted door hardware.

3.3 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.

3.4 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

1. Install rated partition identification signs or stencils above the ceiling at 20 foot intervals, and within 15 feet of the end of each rated wall.

C. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

D. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
   1. Seal joints, cut edges, and holes with water-resistant sealant.

E. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.6 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
   1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   3. Level 3: Walls to receive textured wall finish.
   4. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
   5. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. 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 is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
   3. Taping, filling and sanding is not required at base layer of double layer applications.

C. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

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SECTION 09 30 00

TILING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Stone for wall applications.

D. Ceramic accessories.

E. Ceramic trim.

F. Non-ceramic trim.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.3 SUBMITTALS

A. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

B. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

C. Samples: Mount tile and apply grout on two plywood panels, minimum 18 by 18 inches in size illustrating pattern, color variations, and grout joint size variations.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.5 MOCK-UP

A. Construct tile mock-up where directed by Architect, incorporating all components specified for the location.

1. Approved mock-up may remain as part of the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.7 FIELD CONDITIONS

A. Do not install solvent-based products in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

1.8 MAINTENANCE STOCK

A. Leave remaining tile units from opened packages for maintenance stock. Package for storage, mark with building name and room number, and store where directed.

B. Furnish additional tile from same production run for a total of 2 percent of installed quantity, but not less than 8 square feet, of each Type and Pattern.

PART 2 PRODUCTS

2.1 TILE

A. Manufacturers: As indicated on Schedule of Interior Materials, 09-0601. Provide products or approved.

B. Porcelain Tile: ANSI A137.1, standard grade.

1. Color(s): As indicated on Schedule of Interior Materials, 09-0601.

C. Engineered Stone:

1. Color(s): As indicated on Schedule of Interior Materials, 09-0601.

D. Glazed Wall Tile and Accent Tile : ANSI A137.1

1. Color(s): As indicated on Schedule of Interior Materials, 09-0601.

2.2 TRIM AND ACCESSORIES

A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.

B. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.

1. Manufacturers: Same as for tile.

C. Non-Ceramic Trim: Satin natural anodized extruded aluminum, unless noted otherwise, style and dimensions to suit application, for setting using tile mortar or adhesive.

1. Manufacturers:

a. Schluter-Systems: www.schluter.com. See Schedule of Interior Materials, 09-0601.

2.3 SETTING MATERIALS

A. Provide setting materials made by the same manufacturer as grout.

B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.

1. Products:

a. Custom Building Products; MegaLite Rapid Setting Crack Prevention Mortar: www.custombuildingproducts.com

b. LATICRETE International, Inc; LATICRETE 254 Platinum: www.laticrete.com

c. MAPEI; Ultraflex LFT Rapid: www.mapei.com

2.4 GROUTS

A. Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.

1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.

2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.

3. Color(s): As selected by Architect from manufacturer's full line.

4. Products:
    a. Custom Building Products; Fusion Pro Single Component Grout: www.custombuildingproducts.com
    b. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com
    c. MAPEI; Ultracolor Plus FA: www.mapei.com

2.5 ACCESSORY MATERIALS

A. Waterproofing Membrane and Crack Isolation: Specifically designed for bonding to cementitious substrate under thin-set tile; complying with ANSI A118.10.
    1. Type: Fluid-applied.
    2. Material: Elastomeric / Synthetic rubber.
    3. Thickness: 25 mils, minimum, dry film thickness.
    4. Products:
        a. LATICRETE International, Inc; LATICRETE Hydro Ban: www.laticrete.com
        b. Custom Building Products; RedGard Crack Prevention and Waterproofing Membrane: www.custombuildingproducts.com
        c. MAPEI; Mapelastic AquaDefense: www.mapei.com

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:
    1. Moisture Emission Rate: Not greater than 3 lb per 1000 sq ft per 24 hours, test in accordance with ASTM F1869.
    2. Alkalinity (pH): Verify pH range of 5 to 9, test in accordance with ASTM F710.
E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Protect surrounding work from damage.
B. Vacuum clean surfaces and damp clean.
C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
D. Install backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of setting material to a feather edge.

3.3 INSTALLATION - GENERAL

A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1A thru A108.13, manufacturer's instructions, and TCNA (HB) recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.

E. Form internal angles square and external angles bullnosed.

F. Install ceramic accessories rigidly in prepared openings.

G. Install non-ceramic trim in accordance with manufacturer's instructions.

H. Sound tile after setting. Replace hollow sounding units.

I. Keep control and expansion joints free of mortar, grout, and adhesive.

J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.

K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.

L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.4 INSTALLATION - FLOORS - THIN-SET METHODS

A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated. Provide waterproofing membrane.

3.5 INSTALLATION - WALL TILE

A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

B. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

END OF SECTION

SECTION 09 51 00

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

1.2 SUBMITTALS

A. Shop Drawings: Indicate grid layout and related dimensioning, junctions with other ceiling finishes, and mechanical and electrical items installed in the ceiling.

B. Product Data: Provide data on suspension system components.

1.3 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.4 MAINTENANCE STOCK

A. Leave remaining tile units from opened packages for maintenance stock. Package for storage, mark with building name and room number, and store where directed.

B. Furnish additional tile for a total of 2 percent of installed quantity, but not less than 96 square feet of each type and size.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acoustic Tiles/Panels:

1. Armstrong World Industries, Inc: www.armstrong.com
2. USG: www.usg.com

B. Suspension Systems:

1. Armstrong World Industries, Inc: www.armstrong.com
2. USG: www.usg.com

2.2 ACOUSTICAL UNITS

A. Acoustical Units - General: ASTM E1264, Class A.

B. ACB1 Acoustical Tile: Painted mineral fiber, ASTM E1264 Type XII, Form 2, Pattern E with the following characteristics:

1. Size: 24 by 24 inches.
2. Thickness: 1 inch.
3. Light Reflectance: 0.90 percent, determined in accordance with ASTM E1264.
4. NRC: 0.95
5. Edge: Square tegular.

6. Products:
    a. As indicated on Schedule of Interior Materials 09-0601.

2.3 SUSPENSION SYSTEM(S)

A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

B. Exposed Steel Suspension System 01: Formed steel, commercial quality cold rolled; heavy-duty.
    1. Profile: Tee; 9/16 inch wide face.
    2. Cosntruction: Double web.
    3. Finish: White painted.
    4. Products:
        a. USG Suprafine XL.

2.4 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
    1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Transition Moldings: Same material and finish as grid.

D. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.

E. Hold Down Clips: G30 hot dipped galvanized steel body.
    1. Products:
        a. Armstrong World Industries, Inc; UHDC - Universal Hold Down Clip.
        b. USG; Hold-Down Clip, Q2.

F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.1 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

D. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.

E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

1. Use longest practical lengths. Provide overlapping wall angle, USG Donn, Item no. M7 or equal.
2. Miter corners.

3.2 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:

1. Make field cut edges of same profile as factory edges.

G. Where round obstructions occur, provide preformed closures to match perimeter molding.

H. Install hold-down clips on panels within 20 ft of an exterior door, entry vestibules, and other areas noted on Drawings.

3.3 TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

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SECTION 09 65 00

RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Resilient sheet flooring.

B. Resilient tile flooring.

C. Resilient base and Stainless steel base.

D. Installation accessories.

1.2 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

B. Shop Drawings: Indicate seaming plan.

C. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space.

C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

1.4 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.1 SHEET FLOORING

A. RF1 Vinyl Sheet Flooring: Homogeneous without backing, with color and pattern throughout full thickness.

1. Minimum Requirements: Comply with ASTM F1913.
2. Total Thickness and Wear Layer Thickness: 0.080 inch nominal.
3. Sheet Width: 72 inch minimum.
4. Static Load Resistance: 250 psi minimum, when tested as specified in ASTM F970.
5. Heat welded seams.
6. Finish: UV-cured Polyurethane.
7. Manufacturers:
   a. See Schedule of Interior Materials, 09-0601 for product line and color selection.

B. Vinyl Welding Rod: Solid vinyl bead produced by manufacturer of vinyl flooring for heat welding seams, in color matching field color.

2.2 TILE FLOORING

A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness.
   1. Minimum Requirements: Comply with ASTM F1066, of Class corresponding to type specified.
   2. Size: 12 by 12 inch.
   3. Thickness: 0.125 inch.
   4. Manufacturers:
      a. See Schedule of Interior Materials, 09-0601 for product line and color selection.

2.3 RESILIENT BASE

A. Resilient Base: ASTM F1861, Type TS rubber, vulcanized thermoset; top set Straight at carpeted surfaces and Cove at hard surfaces as indicated on Schedule of Interior Materials, 09-0601.
   1. Height: 4 inch.
   2. Thickness: 0.125 inch thick.
   3. Finish: Satin.
   4. Color: To be selected by Architect from manufacturer's full range.
   5. Manufacturers:
      a. See Schedule of Interior Materials, 09-0601 for product line.

B. Stainless Steel Base: 22 gage, Grade CS304 with #4 Satin finish, brushed.
   1. Height: 4 inch, unless noted otherwise.
   2. Lengths: 48 and 96 inche.
   3. Corners: Pre-formed inside and outside corners.
   4. Exposed Edges: Eased.
   5. Adhesive: Type as recommended by manufacturer.

2.4 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers, Adhesives, and Seaming Materials: Waterproof; types recommended by flooring manufacturer.

C. Transition Strips:
   1. Manufacturers:
      a. See Schedule of Interior Materials, 09-0601 for product line and color selection.

D. Moldings, Transition and Edge Strips:
   1. Manufacturers:
      a. See Schedule of Interior Materials, 09-0601 for product line and color selection.

E. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

A. Contractor shall verify moisture level of concrete using Calcium Chloride Test per ASTM F1869, to verify moisture vapor emission rates and pH levels are within flooring manufacturer's acceptable range.

B. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

C. Prohibit traffic until filler is cured.

3.2 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's instructions.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Fit joints tightly.

E. Set flooring in place, press with heavy roller to attain full adhesion.

F. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.3 SHEET FLOORING

A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns carefully at seams.

B. Double cut sheet at seams.

C. Lay flooring with tightly butted seams, without any seam sealer unless otherwise indicated.

3.4 INSTALLATION - TILE FLOORING

A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

3.5 RESILIENT BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.6 STAINLESS STEEL BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Provide premolded corner units at external and internal corners, exposed ends.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

3.7 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's instructions.

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Carpet tile, loose laid with edges and control grid adhered.

1.2 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

B. Shop Drawings: Indicate layout of joints.

C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

PART 2 PRODUCTS

2.1 MATERIALS

A. Carpet Tile: Manufactured in one color dye lot.

1. Product: As indicated on Schedule of Interior Materials, 09-0601. Provide indicated product or approved.
2. Critical Radiant Flux: Minimum of 0.22 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
3. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
4. VOC Content: Provide CRI Green Label Plus certified product; in lieu of labeling, independent test report showing compliance is acceptable.

2.2 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install carpet tile in accordance with manufacturer's instructions and CRI Carpet Installation Standard.

C. Install carpet according to approved layout diagrams. Do not place seams in traffic directions at doorways; center seams at doorways under doors. Locate change of color or pattern between rooms under door centerline.

D. Integrate and blend carpet from different cartons to ensure minimal variation in color match. Spot adhere to substrate.

E. Extend carpet under open bottom obstructions, under removable flanges and furnishings, and into alcoves and closets of each space unless otherwise indicated.

F. Provide cutouts where required. Bind cut edges where not concealed by protective edge guards or overlapping flanges.

G. Provide for movement at building expansion joints; do not bridge such joints with continuous carpet.

H. Install carpet transition strip where edge of carpet meets hard surface flooring. Mechanically anchor to substrate.

I. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

J. Trim carpet tile neatly at walls and around interruptions.

K. Complete installation of edge strips, concealing exposed edges.

END OF SECTION

SECTION 09 72 00

WALL COVERINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation and prime painting.

B. Wall covering .

1.2 SUBMITTALS

A. Product Data: Provide data on wall covering and adhesive.

B. Shop Drawings: Indicate wall elevations with seaming layout.

C. Samples: Submit two samples of wall covering, 8x8 inch in size illustrating color, finish, and texture.

1.3 MOCK-UP

A. Provide panel, 10 feet wide, full height, illustrating installed wall covering and joint seaming technique.

B. Locate where directed.

C. Mock-up may remain as part of the Work.

1.4 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall covering product manufacturer.

B. Maintain these conditions 24 hours before, during, and after installation of adhesive and wall covering.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces.

PART 2 PRODUCTS

2.1 MATERIALS

A. Requirements for All Wall Coverings:

1. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84.

B. Wall Covering : Vinyl coated fabric roll stock, conforming to the following:

1. Manufacturer, color and pattern: As indicated on Schedule of Interior Materials, 09-0601.

2. Type: Federal Specifications: CCC-W-408D for Type II wallcovering. Class A, in accordance with ASTM E84.

3. Protective Coating: Clear, water-based coating compatible with vinyl wall covering, acceptable to manufacturer.

C. Adhesive: Type recommended by wall covering manufacturer to suit application to substrate.

D. Termination Trim: Extruded plastic, clear.

E. Substrate Filler: As recommended by adhesive and wall covering manufacturers; compatible with substrate.

F. Substrate Primer and Sealer: Alkyd enamel type.

PART 3 EXECUTION

3.1 INSTALLATION

A. Apply adhesive and wall covering in accordance with manufacturer's instructions.

B. Use wall covering in roll number sequence.

C. Apply wall covering smooth, without wrinkles, gaps or overlaps. Eliminate air pockets and ensure full bond to substrate surface. Butt edges tightly.

D. Horizontal seams are not acceptable.

E. Install termination trim.

F. Remove excess adhesive while wet from seam before proceeding to next wall covering sheet. Wipe clean with dry cloth.

3.2 CLEANING

A. Clean wall coverings of excess adhesive, dust, dirt, and other contaminants.

B. Reinstall wall plates and accessories removed prior to work of this section.

END OF SECTION

SECTION 09 90 00

PAINTING AND COATING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, varnishes, and other coatings.

C. Scope: Finish all interior and exterior surfaces exposed to view, unless fully factory-finished

D. Do Not Paint or Finish the Following Items:

1. Items fully factory-finished unless specifically so indicated; materials and products having factory-applied primers are not considered factory finished.
2. Stainless Steel or plated metal finishes.
3. Plastics, acoustical materials, face brick, stonework, chalkboards, and other surfaces not normally requiring a painted finish.
4. Items indicated to receive other finishes.
5. Items indicated to remain unfinished.
6. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
7. Floors, unless specifically so indicated.
8. Glass.
9. Concealed pipes, ducts, and conduits.

1.2 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. 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.

B. Finish Schedule: Include all surfaces to be painted, manufacturer, type and color to be applied to each surface.

C. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Paint and Coatings: 1 gallon of each color; store where directed.
2. Label each container with color in addition to the manufacturer's label.

1.3 MOCK-UP

A. Provide panel, 3 feet long by 3 feet wide, illustrating verification of coating color, texture, and finish.

B. Provide sample panels of each color requested by Owner or Architect.

1.4 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.

1.5 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide all paint and coating products used in any individual system from the same manufacturer; no exceptions.

B. Provide all paint and coating products from the same manufacturer to the greatest extent possible.

C. Paints:

1. Base Manufacturer: Sherwin-Williams Company: www.sherwin-williams.com
2. Diamond Vogel Paints: www.diamondvogel.com
3. Benjamin Moore & Co: www.benjaminmoore.com
4. PPG Architectural Finishes, Inc: www.ppgaf.com
5. Hirshfield's Paints & Coatings: www.hirshfields.com

D. Primer Sealers: Same manufacturer as top coats.

E. Block Fillers: Same manufacturer as top coats.

2.2 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, unless intended to be a field-catalyzed coating.

1. Provide paints and coatings 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.
2. Supply each coating material in quantity required to complete entire project's work from a single production run.
3. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.

B. Primers: As follows unless other primer is required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

1. Gypsum Board: Interior Latex Primer Sealer; MPI #50.

2. Concrete Masonry: Interior/Exterior Latex Block Filler; MPI #4.
3. Steel, Uncoated: Interior Rust-Inhibitive Water Based Primer; MPI #107.
4. Galvanized Steel: Interior Water Based Galvanized Primer; MPI #134.
5. Architecturally Exposed Structural Steel: Shop applied epoxy primer.
6. Wall Surfaces to receive Vinyl Wall Covering: Shewin Williams Premium Wall & Wood Interior Latex Primer.

C. Volatile Organic Compound (VOC) Content:
1. Provide coatings 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.
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.

D. Sheens: Provide sheens specified.
1. Flat: 0 to 9 units at 85 degrees. MPI Gloss Level 1.
2. Eggshell: 10 to 24 units @ 85 degrees. MPI Gloss Level 3.
3. Satin: 25 to 29 units @ 60 degrees. MPI Gloss Level 4.
4. Semi-gloss: 30-45 units @ 60 degrees. MPI Gloss Level 5.
5. Gloss: 70 units minimum @ 60 degrees. MPI Gloss Level 6.

E. Colors: As indicated on drawings PNT number designations are for color only. Paint Systems listed below do not correspond to color.
1. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.

2.3 PAINT SYSTEMS - EXTERIOR

A. Paint System 1 All Exterior Concrete and Concrete Masonry surfaces indicated to be painted, unless otherwise indicated:
1. Two top coats and one coat primer.
2. Top Coat(s): Exterior Latex; MPI #15.
3. Satin: MPI gloss level 4; use this sheen at all locations.
4. Primer(s): As recommended by manufacturer of top coats.

B. Paint System 2 All Exterior Ferrous Metal, Primed Metal, and Zinc-coated metal surfaces indicated to be painted, unless otherwise indicated:
1. Two top coats and one coat primer.
2. Top Coat(s): Exterior Latex; Sherwin-Williams, Exterior Latex High Gloss, A85 Series.
3. High Gloss: MPI gloss level 7; use this sheen at all locations.
4. Primer(s): As recommended by manufacturer of top coats.

2.4 PAINT SYSTEMS - INTERIOR

A. Paint System 4 All Interior Gypsum Board and Concrete Masonry Unit surfaces indicated to be painted, unless otherwise indicated:

1. Two top coats and one coat primer.
2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #143-148.
3. Flat: MPI gloss level 1; use this sheen at for ceilings and other overhead surfaces.
4. Eggshell: MPI gloss level 3: use this sheen where indicated.
5. Semi-Gloss: MPI gloss level 5; use this sheen where indicated.
6. Primer(s): As recommended by manufacturer of top coats.

B. Paint System 5 Interior Gypsum Board and CMU surfaces in Wet Areas, Service Areas, and Toilet Rooms indicated to be painted, unless otherwise indicated:
1. Two top coats and one coat primer.
2. Top Coat(s): Institutional Low Odor/VOC Interior Latex; MPI #115.
3. Semi-Gloss: MPI gloss level 6; use this sheen at all locations.
4. Primer(s): As recommended by manufacturer of top coats.

C. Paint System 6 All Interior Ferrous Metal, Primed Metal, zinc-coated metal, and aluminum surfaces indicated to be painted, unless otherwise indicated.
1. Two top coats and one coat primer.
2. Primer(s): As recommended by manufacturer of top coats.
3. Top Coat(s): Interior Light Industrial Coating, Water Based; MPI #153-154.
4. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.

D. Paint System 7 All Interior floors noted to have a Sealed Concrete Finish.
1. Three coats of chemical hardener: W.R. Meadows, Liqui-Hard or equal.

2.5 ACCESSORY MATERIALS

A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required to achieve the finishes specified whether specifically indicated or not; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to coating 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 mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

F. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate;

rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

G. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

H. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

I. Shop-Primed Steel Surfaces to be Finish Painted: 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.

J. Interior Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

3.2 APPLICATION

A. Apply products in accordance with manufacturer's instructions.

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

D. Sand wood and metal surfaces lightly between coats to achieve required finish.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.3 **SCHEDULE - PAINT SYSTEMS**

A. Concrete

1. Exterior: Paint System 1.

B. Gypsum Board

1. Interior Ceilings and Bulkheads: Paint System 4, Flat.
2. Interior Walls: Paint System 4, Egshell.

C. Gypsum Board, CMU (Wet Areas)

1. Interior Ceilings and Bulkheads: Paint System 5, Egshel.
2. Interior Walls: Wainscots: Paint System 5, Semi-Gloss.

D. Steel Doors and Frames

1. Exterior: Paint System 2, Semi-Gloss.
2. Interior: Paint System 6, Semi-Gloss.

E. Concrete Floors

1. Paint System 7

F. Wall Surfaces Under Vinyl Wall Covering
   1. Sherwin Williams Premium Interior Wall and Wood Primer B28W8111.

END OF SECTION

SECTION 10 26 01

WALL AND CORNER GUARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Corner guards.

B. Wall Protection.

1.2 SUBMITTALS

A. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wall and Corner Guards:

1. Construction Specialties, Inc; Acrovyn Wall & Door Protection: www.c-sgroup.com
2. Inpro; Corner Guards: www.inprocorp.com
3. Korogard Wall Protection Systems: www.koroseal.com

2.2 COMPONENTS

A. CG1 Corner Guards - Surface Mounted, Stainless Steel, Type 304: Screw on applied with countersunk philips head screws. Holes shall be pre-drilled and beveled.

1. Performance: Resist lateral impact force of 100 lbs at any point without damage or permanent set.
2. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
3. Corner: 90 degrees. 1/8 inch radius.
4. Size: 3 inch X 3 inch X full height, as indicated on drawings.
5. Thickness: 16 gage.
6. Finish: No. 4 satin finish.
7. Basis of Design Product:
   a. Koroseal Wall Protection Systems, Koroseal 'Korogard' Series GS30.

B. Wall Protection - High Impact rigid sheet

1. Material: Polyethylene terephthalate (PET or PETG); PVC-free; smooth surface.
   a. Thickness: 0.040 inch.
   b. Sheet Size: 4 foot x 8 foot.
2. Color: As indicated on Schedule of Interior Materials, 09-0601.
3. Surface Burning Characteristics: Provide assemblies with flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.

4. Products:
    a. Inpro G2-405.
    b. Construction Specialties, Inc, Acrovyn 4000.
5. No vertical trim/divider bars. Provide silicone butt joint and metal top cap.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to wall framing members only.

B. Install corner guards with countersunk stainless steel screws provided by manufacturer in a bead of heavy duty adhesive in a zigzag pattern over the back of each wing in accordance with manufacturer's instructions.

3.2 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

B. Maximum Variation From Level or Plane For Visible Length: 1/4 inch.

END OF SECTION

SECTION 10 28 00

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Accessories for toilet rooms and utility rooms.

B. Items indicated as 'OFCI' are Owner Furnished, Contractor Installed. Items indciated as 'OFOI' are Owner Furnished, Owner Installed.

C. Mirrors.

D. Grab bars.

1.2 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.3 SUBMITTALS

A. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.

B. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. American Specialties, Inc: www.americanspecialties.com

B. Bradley Corporation: www.bradleycorp.com

C. Bobrick Washroom Equipment, Inc: www.bobrick.com

D. Georgia-Pacific Professional: www.gppro.com

2.2 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

1. Grind welded joints smooth.

2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Stainless Steel Sheet: ASTM A666, Type 304.

C. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.

D. Mirror Glass: Tempered safety glass, ASTM C1048; and ASTM C1036 Type I, Class 1, Quality Q2, with silvering as required.

E. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

2.3 FINISHES

A. Stainless Steel: No. 4 Brushed finish, unless otherwise noted.

B. Chrome/Nickel Plating: ASTM B456, SC 2, satin finish, unless otherwise noted.

C. Baked Enamel: Pretreat to clean condition, apply one coat primer and minimum two coats epoxy baked enamel.

D. Galvanizing for Items Other than Sheet: Comply with ASTM A123/A123M; galvanize ferrous metal and fastening devices.

E. Back paint components where contact is made with building finishes to prevent electrolysis.

2.4 TOILET ROOM ACCESSORIES

A. Toilet Paper Dispenser (OFCI): Double roll, surface mounted, high impact plastic, smooth cover with no recesses.

B. Semi-recessed automated towel dispenser: Powered by 4 D cell alkaline batteries. Unit shall have LED indicator lights for low paper, motor/sensor activation, and low battery. Dispensing modes: on demand and hanging towel modes. Cover finish: 24 gage, stainless steel #304 with #4 stain brush vertical grain finish.

1. Towel dispenser capacity: Roll: 8.2 inches wide X 425 lineal feet.
2. Product: enMotion Model #59466 manufactured by Georgia-Pacific.

C. Soap Dispenser (OFCI): Wall mounted vertical design.

D. Mirrors - Framed: Stainless steel framed, 1/4 inch thick tempered safety glass; ASTM C1048.

1. Size: As indicated on Interior Elevations.
2. Frame: 0.05 inchangle shapes, with mitered and welded and ground corners, and tamperproof hanging system; No.4 finish.
3. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
4. Product: B-165 1836 manufactured by Bobrick Washroom Equipment, Inc.

E. Grab Bars: Stainless steel, nonslip grasping surface finish.

1. Heavy Duty Grab Bars:
   a. Push/Pull Point Load: 900 pound-force, minimum.
   b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, concealed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
   c. Length and Configuration: As indicated on drawings.
   d. Products:
      1) Bradley Corporation, 812 Series Grab Bars.

F. Sanitary Napkin Disposal Unit: Premium quality plastic, surface-mounted, tight-fitting lid and removable rigid liner.

1. Product: 6140 manufactured by Rubbermaid.

G. Double Robe Hook: Heavy-duty stainless steel, double-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

1. Product: B-6727 manufactured by Bobrick Washroom Equipment, Inc.

2.5 UTILITY ROOM ACCESSORIES

A. Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, hat-shaped channel.
   1. Holders: 4 spring-loaded rubber cam holders.
   2. Length: Manufacturer's standard length for number of holders.
   3. Product: 8215-4 manufactured by American Specialties, Inc.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.
B. Install plumb and level, securely and rigidly anchored to substrate.
C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.

END OF SECTION

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SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.2 SUBMITTALS

A. Shop Drawings: Indicate cabinet physical dimensions and wall bracket mounted measurements.

B. Product Data: Provide extinguisher operational features.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Fire Extinguisher Cabinets and Accessories:

1. JL Industries, Inc: www.jlindustries.com
2. Larsen's Manufacturing Co: www.larsensmfg.com
3. Others as approved.

2.2 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 for the purpose specified and indicated.

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gage.

1. Class: A:B:C type.
2. Size: 10 pound.
3. Temperature range: Minus 40 degrees F to 120 degrees F.

2.3 FIRE EXTINGUISHER CABINETS

A. FEC1 Surface mounted bracket. Steel with powder coat paint finish (red). Provide J-Hook with bracket.

1. Basis of Design: JL Industries; MB846C (chrome strap): www.jlindustries.com

B. FEC2 Surface mounted cabinet configuration. Galvanized steel cabinet with white powder-coat finish.

1. Door: 0.060 inch acrylic front. Chain mounted breaker bar and manufacturer's standard cylinder lock.
2. Trim: Square edge.

2.4 ACCESSORIES

A. Extinguisher Brackets: Formed steel, chrome-plated.

B. Cabinet Signage: Red Vertical Decal - 'FIRE EXTINGUISHER'.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, 38 inches from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers and accessories in cabinets.

END OF SECTION

SECTION 12 48 13

ENTRANCE FLOOR MATS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Carpet tile walk-off mat.

1.2 SUBMITTALS

A. Product Data: Provide data indicating properties of walk-off surface, component dimensions.

B. Shop Drawings: Indicate dimensions and installation details.

C. Samples: Submit two carpet tiles (full size) illustrating pattern, color, finish and edging.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Carpet Tile Mats:

1. As indicated on Schedule of Interior Materials, 09-0601.

2.2 MATS

A. Carpet Tile Mat: Multi-level Pattern Loop.

1. Gauge: 1/12.
2. Finished Pile Thickness: 0.115 inches, average.
3. Backing Material: Polyolefin composite.
4. Fiber Type: Nylon.
5. Face Weight: 28 ounces per square yard.
6. Size: 24 inches x 24 inches.
7. Color and Pattern: As indicated on Schedule of Interior Materials, 09-0601..

2.3 ACCESSORIES

A. Sub-Floor Filler: White premix latex type recommended by flooring material manufacturer.

B. Edge Strips: Embossed aluminum, color as selected.

C. Adhesives: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install walk-off surface after cleaning of finish flooring. Install according to approved diagrams.

B. Follow manufacturer's written installation instructions.

C. Provide cutouts where required. Bind cut edges where not concealed by protective edge guards or overlapping flanges.

D. Provide for movement at building expansion joints; do not bridge such joints with continuous carpet.

E. Install carpet edge guard where edge of carpet meets hard surface flooring. Mechanically anchor to substrate.

F. Fit each section of carpet before applying adhesive. Trim edges and butt cuts with seaming cement.

G. Apply adhesive uniformly to substrate. Butt edges tight to form seams without gaps. Roll entire areat lightly to eliminate air pockets and ensure tight bond.

H. Trim carpet tile neatly at walls and around interruptions.

I. Complete installation of edge strips, concealing exposed edges.

END OF SECTION

SECTION 12 93 00

SITE FURNISHINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Bicycle racks.

B. Related Sections:
   1. Section 32 13 13 – “Concrete Paving”.

1.3 SUBMITTALS

A. Product Data: For each type of product, including physical characteristics such as shape, dimension, capacity and finish for each type of site furnishings.

B. Shop Drawings: Provide shop drawings for each type of site furnishing indicating installation details.

C. Material Certificates: For site furnishings.

D. Maintenance Data: For site furnishings to include in maintenance manuals. Include recommended methods for repairing damage to the finish.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing site furnishings similar to those required for this project and with a record of successful in-service performance.

B. Source Limitations: Obtain each color, finish, shape and type of site furnishing from a single source with resources to provide components of consistent quality in appearance and physical properties.

1.5 SUBSTITUTIONS

A. Product substitutions may be considered as an equivalent only if proposed substitution meets all areas of this specification without exception. Manufacturers seeking consideration as an equivalent product must submit product data, records, test results, samples, certifications and any additional documentation deemed necessary by Owners project representative to prove

equivalency. Owners project representative must review and approve proposed substitutions prior to their ordering and use.

PART 2 - PRODUCTS

2.1 BICYCLE RACKS

A. "Spartan" by Madrax, 1-800-448-7931, www.madrax.com or approved equal.

B. Description: Steel bike rack with the following characteristics:
1. Single sided bike rack
2. 6-8 bike parking stalls
3. 147"x20"x34" overall dimensions
4. 2 3/8" O.D. steel tube posts
5. 1 5/8" O.D. steel tube loops
6. ¾" O.D. steel tube locking rods

C. Model: SPR-SNG-6-SF

D. Finish: Powdercoat

E. Color: Black

F. Mounting: Surface mount for each rack as indicated in the manufacturer's standard specifications and detail drawings.

G. Hardware: Provide Grade 316 stainless steel, tamper-proof anchoring hardware in sizes and quantities indicated by manufacturer's standards specifications and detail drawings.

H. Installation: Install and anchor to concrete pavements per manufacturer's standard specifications and detail drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for correct and level finished grade, mounting surfaces, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.

B. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.

C. Install site furnishings level, plumb, true, and securely anchored at locations indicated on Drawings.

D. Clean all site furnishings after installation and inspect for damage. Document any damage to installed furnishings and provide documentation to Owner; repair damage per manufacturer's recommendations OR be responsible for a full replacement of any site furnishings with damage that exceeds small repairs or touch-ups as determined by the Owner.

END OF SECTION

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SECTION 14 20 10

PASSENGER ELEVATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Complete elevator systems.

B. Elevator maintenance.

1.2 RELATED REQUIREMENTS

A. Section 05 12 00 - Structural Steel Framing: Includes hoistway framing.

B. Section 05 50 00 - Metal Fabrications: Includes pit ladder, sill supports, divider beams, and overhead hoist beams.

C. Section 07 13 00 - Sheet Waterproofing: Waterproofing of elevator pit walls and floor.

D. Section 09 21 16 - Gypsum Board Assemblies: Gypsum shaft walls.

E. Section 26 27 17 - Equipment Wiring:

1. Electrical characteristics and wiring connections.
2. Required disconnect switches.
3. Electrical power for elevator installation and testing.
4. Lighting in elevator pit.
5. Conduit for dedicated telephone line.

F. Section 28 31 00 - Fire Detection and Alarm:

1. Fire and smoke detectors and interconnecting devices.
2. Fire alarm signal lines to elevator controller cabinet.

1.3 **ADMINISTRATIVE REQUIREMENTS**

A. Preinstallation Meeting: Convene a meeting one week prior to starting work.

1. Review schedule of installation, installation procedures and conditions, and coordination with related work.

B. Construction Use of Elevator: Not permitted.

1.4 SUBMITTALS

A. Product Data: Provide data on the following items:

1. Signal and operating fixtures, operating panels, indicators.
2. Cab design, dimensions, layout, and components.
3. Cab and hoistway door and frame details.
4. Electrical characteristics and connection requirements.
5. Expected heat dissipation of elevator equipment in hoistway (BTU).

B. Shop Drawings: Indicate the following information:

1. Equipment arrangement for pit and hoistway. Provide plans, elevations, sections and details of assembly, erection, anchorage and equipment components. Include hoistway door and frame details.
2. Elevator system capacity and size. Provide maximum loads imposed on guide rails requiring load transfer to building structure.
3. Travel distances and maximum loads imposed on the building structure at points of support.
4. Electrical power requirements and branch circuit protection devices.

C. Maintenance Contract.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with applicable code and ASME A17.1.

B. Fabricate and install door and frame assemblies in accordance with NFPA 80.

C. Perform electrical work in accordance with NFPA 70.

D. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum ten years documented experience.

E. Installer Qualifications: Elevator shall be installed by manufacturer personnel.

1.6 WARRANTY

A. Provide one year manufacturer warranty for elevator operating equipment and devices. Include maintenance and call back service for a period of one year after the date of Substantial Completion. Service shall include periodic examination of equipment, adjustment, cleaning, supplies and parts to keep the elevators in proper operation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: KONE MonoSpace MRL traction elevator: www.kone.us

B. Other Acceptable Manufacturers:

1. ThyssenKrupp Elevator; Synergy 300: www.thyssenkruppelevator.com

C. These manufacturers are acceptable if they can manufacture cab to fit within maximum hoistway dimensions indicated on Drawings.

1. Otis Elevator Co: www.otis.com
2. Schindler Elevator Corp: www.us.schindler.com

D. All components to be manufactured by same entity, unless otherwise indicated.

E. Elevator Pit and Hoistway dimensions are based on the Kone Basis of Design elevator. Contractor shall verify required pit and hoistway dimensions. Adjustment to dimensions will need to be reviewed by Architect prior to elevator pit layout.

2.2 ELEVATORS

A. Elevator EL01 and EL02: Passenger.

1. Cab Height: 93 inches.
2. Hoistway and Cab Entrance Frame Opening Size: 42 x 84 inches.
3. Door Operation: Center opening. Front.

4. Rated Net Capacity: 3500 lbs.
5. Rated Speed: 350 ft/min.
6. Hoistway Clear Dimensions: 8'-4" x 7'-10".
7. Clear Car Inside: 6'-5-1/2" x 5'-6-5/8".
8. Travel Distance: 42'-10".
9. Minimum Clear Overhead: 15'-5".
10. Number of Stops: 5.
11. Machine Location: Inside the hoistway mounted on car guide rail.
12. Controller Location: Inside hoistway, top landing.

B. Elevator Cab Finishes:

1. Shell: Reinforced 14 gage furniture steel with baked enamel interior finish as selected. Apply sound deadening mastic to exterior.
2. Canopy: Reinforced 12 gage furniture steel with hinged emergency exit. Interior finish white, reflective baked enamel. Provide brushed stainless steel panels on visible portions of cab canopy.
3. Car Door Panels: Flush both sides, minimum reinforced 16 gage brushed stainless steel, rib construction. Same construction as hoistway door panels.
4. Walls: Stainless steel panels manufactured by Forms+Surfaces as selected by Architect. See Schedule of Interior Materials, 09-0601.
5. Ceiling: Suspended, concealed stainless steel, No. 4 finish. LED downlights with trim rings and protective screens.
6. Handrail: 3/8 inch x 2 inch flat tubular, stainless steel, No. 4 finish. Mount on rear and side walls.
7. Flooring: Resilient as indicated on Schedule of Interior Materials, 09-0601.
8. Threshold: Mill finish aluminum.
9. Ventilation: Manufacturer's standard exhaust fan, mounted on the car top.
10. Pads and Buttons: Provide two complete sets of cab removable pads and buttons in elevator. Provide one pad each to cover each side wall and each front and rear panel returns. Provide cutouts to access main car operating panel.
11. Car Top Inspection: Provide a car top inspection station with 'Auto-Inspection' switch and 'Emergency Stop' switch, and constant pressure up and down direction and safety buttons to make the normal operating devices inoperative. The station will give the inspector complete control of the elevator. The car top inspection station shall be mounted in the door operator assembly.

C. Elevator Hoistway Entrances

1. Doors and Frames: Manufacturer's standard entrance design consisting of hangers, doors, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
2. Door and Frame Finish: Stainless Steel, brushed, #4 finish.
3. Hoistway Sills: Extruded aluminum, mill finish with grooved top surface.

2.3 CONTROLS

A. Elevator Controls: Provide landing buttons and hall lanterns.

B. Door Controls:
   1. Program door control to open doors automatically when car arrives at floor.
   2. Render "Door Close" button inoperative when car is standing at dispatching terminal with doors open.
   3. If doors are prevented from closing for approximately ten seconds because of an obstruction, automatically disconnect door reopening devices, close doors more slowly until obstruction is cleared. Sound buzzer.
   4. Door Protection Devices: Infra-red light beam system. Beams shall project across the car opening to detect the presence of a passenger or object. If door movement is obstructed, doors shall immediately reopen.

C. Hall Stations: Illuminating buttons to indicate call has been registered at the floor for the indicated direction. Faceplates shall be stainless steel.
   1. Phase 1 firefighter's service key switch shall be incorporated into the hall station.

D. Landing Position Indicators: Illuminating white.

E. Car Direction Indicators: Illuminating white.

F. Floor identification: Provide door jamb pads that meet ADA requirements at each floor.

G. Regulatory Elevator Lobby Plaque Sign: Egress Route Sign with text that reads 'In Case of Fire Elevators Are Out of Service Use Stairs.' Graphics shall be chemically etched and paint filled to stainless steel plaque.

H. Interconnect elevator control system with building fire alarm system.

I. Provide 'Firefighter's Operation' in accordance with applicable code. Designated Landing, First Floor.

J. Provide integral phone system for Emergency Communication system.

2.4 EQUIPMENT

A. Machine: AC gearless machine, with permanent magnet synchronous motor, direct current electro-mechanical disc brakes and integral traction drive sheave, mounted to the car guide rail at the top of the hoistway.

B. Governor: Friction type over-speed governor rated for the duty of the elevator.

C. Buffers, Car and Counterweight: Polyurethane buffer.

D. Hoistway Operating Devices:
   1. Emergency stop switch in the pit.
   2. Terminal stopping switches.
   3. Emergency stop switch on the machine.

E. Positioning System: Consisting of magnets and proximity switches.

F. Guide Rails and Attachments: Steel rails with brackets and fasteners.

2.5 EMERGENCY POWER

A. Arrange elevator operation to operate under emergency power when normal power supply fails.

B. Emergency Power Supply: Self-contained battery power.
   1. When the loss of normal power is detected, the battery lowering feature is activated. The elevator will lower to predetermined level (first floor) and open the doors. All passengers can

exit the car, after which the doors will close and the car will shutdown. The elevator will automatically resume operation after building power is restored.

2.6 ELECTRICAL CHARACTERISTICS AND COMPONENTS

A. Electrical Characteristics:

1. 480 volts, three phase, 60 Hz.

B. Provide circuit breakers per local Elevator Code Official requirements.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify hoistway shaft and openings are of correct size and within tolerance.

B. Verify that electrical power is available and of the correct characteristics.

3.2 PREPARATION

A. Arrange for temporary electrical power for installation work and testing of elevator components.

3.3 INSTALLATION

A. Install system components. Connect equipment to building utilities.

B. Provide conduit, boxes, wiring, and accessories.

C. Accommodate equipment in space indicated.

D. Install guide rails using threaded bolts with metal shims and lock washers under nuts. Compensate for expansion and contraction movement of guide rails.

E. Accurately machine and align guide rails. Form smooth joints with machined splice plates.

F. Coordinate installation of hoistway wall construction.

G. Install hoistway door sills, frames, and headers in hoistway walls. Grout sills in place. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.

H. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent; prime two coats.

I. Adjust equipment for smooth and quiet operation.

3.4 ERECTION TOLERANCES

A. Guide Rail Alignment: Plumb and parallel to each other within 1/8 inch.

3.5 FIELD QUALITY CONTROL

A. Testing and inspection by regulatory agencies will be performed at their discretion.

1. Schedule tests with agencies and notify Owner and Architect.
2. Perform tests required by regulatory agencies.
3. Furnish test and approval certificates issued by authorities having jurisdiction.

3.6 ADJUSTING

A. Adjust for smooth acceleration and deceleration of car so not to cause passenger discomfort.

B. Adjust automatic floor leveling feature at each floor to achieve 1/4 inch from flush.

3.7 CLEANING

A. Remove protective coverings from finished surfaces.

B. Clean surfaces and components ready for inspection.

3.8 PROTECTION

A. Do not permit construction traffic within cab after cleaning.

B. Protect installed products until project completion.

C. Touch-up, repair, or replace damaged products before Date of Substantial Completion.

3.9 MAINTENANCE

A. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the elevator manufacturer or original installer.

B. Provide service and maintenance of elevator system and components for one year from Date of Substantial Completion.

C. Examine system components monthly. Clean, adjust, and lubricate equipment.

D. Include systematic examination, adjustment, and lubrication of elevator equipment. Maintain hydraulic fluid levels. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original equipment. Replace wire ropes when necessary to maintain the required factor of safety.

E. Perform work without removing cars during peak traffic periods.

F. Provide emergency call back service at all hours for this maintenance period.

END OF SECTION

SECTION 14 91 85

SNOW CHUTE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gravity chutes for snow removal.

1.2 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.

1.3 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 hopper/funnel enclosure.
2. Location 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

2.1 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.

2.2 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. Section Chains with Bolts: Chains with Hooks, Plates, and Bolts.

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

3.1 INTERFACE WITH OTHER WORK

A. Coordinate installation of snow chute with precast concrete wall panel enclosure.

3.2 INSTALLATION

A. Install snow chute plumb and without offsets or obstrutions 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 21 05 00

BASIC FIRE SUPPRESSION MATERIALS AND METHODS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Pipe, fittings, valves, and connections for standpipe and fire hose systems.

B. Related Sections:
1. Applicable provisions of Division 01 shall govern all work under this Section.
2. Division 03 – Concrete.
3. Division 09 – Finishes: Execution requirements for piping painting specified by this section.

1.2 REFERENCES

A. American Society of Mechanical Engineers (ASME):
1. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
2. ASME B16.11 - Forged Steel Fittings - Socket-Welding and Threaded.
3. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings.
4. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
5. ASME B16.25 - Buttwelding Ends.
6. ASME B16.3 - Malleable Iron Threaded Fittings.
7. ASME B16.4 - Gray Iron Threaded Fittings.
8. ASME B16.5 - Pipe Flanges and Flanged Fittings.
9. ASME B16.9 - Factory-Made Wrought Steel Buttwelding Fittings.
10. ASME B36.10M - Welded and Seamless Wrought Steel Pipe.

B. American International (ASTM):
1. ASTM A47 - Standard Specification for Ferritic Malleable Iron Castings.
2. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A135 - Standard Specification for Electric-Resistance-Welded Steel Pipe.
4. ASTM A234 - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
5. ASTM A795 - Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use.
6. ASTM B247 - Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings.
7. ASTM B32 - Standard Specification for Solder Metal.
8. ASTM B75 - Standard Specification for Seamless Copper Tube.
9. ASTM B88 - Standard Specification for Seamless Copper Water Tube.
10. ASTM B251 - Standard Specification for General Requirements for Wrought Seamless Copper and Copper-Alloy Tube.
11. ASTM D3309 - Standard Specification for Polybutylene (PB) Plastic Hot- and Cold-Water Distribution Systems.

12. ASTM F438 - Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
13. ASTM F439 - Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
14. ASTM F442 - Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).
15. ASTM F493 - Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

C. American Welding Society (AWS):
1. AWS A5.8 - Specification for Filler Metals for Brazing and Braze Welding.
2. AWS D1.1 - Structural Welding Code - Steel.

D. American Water Works Association (AWWA):
1. AWWA C110 - American National Standard for Ductile-Iron and Grey-Iron Fittings, 3 in. through 48 in. for Water and Other Liquids.
2. AWWA C111 - American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
3. AWWA C151 - American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.

E. National Fire Protection Association (NFPA):
1. NFPA 13 - Installation of Sprinkler Systems.
2. NFPA 14 - Standard for the Installation of Standpipe, Private Hydrants and Hose Systems.
3. NFPA 24 - Installation of Private Fire Service Mains and Their Appurtenances.

1.3 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13.

B. Perform Work in accordance with state and local building codes.

1.4 PROTECTION OF FINISHED SURFACES

A. Division 01 - General Requirements: Protection of Finished Surfaces.

1.5 SLEEVES AND OPENINGS

A. Division 01 - General Requirements: Sleeves and opening patching.

1.6 SEALING AND FIRESTOPPING

A. Sealing and firestopping of sleeves and related openings between piping and sleeve and structural opening shall be responsibility of Contractor whose work penetrates opening.

B. Contractor responsible shall provide individuals skilled in such work to do sealing and fireproofing.

1.7 SUBMITTALS

A. Division 01- General Requirements: Submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

C. Product Data: Submit manufacturer's catalogue information. Indicate valve data and ratings.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.8 CLOSEOUT SUBMITTALS

A. Division 01 – General Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of components and tag numbering.

C. Operation and Maintenance Data: Submit spare parts lists.

1.9 GOVERNING AGENCIES

A. Comply with requirements of State and local fire codes.

1.10 OPERATING AND MAINTENANCE INSTRUCTIONS

A. Division 01 - General Requirements: Operating and maintenance instructions.

B. Assemble material in three-ring or post binders, using an index at front of each volume and tabs for each system or type of equipment.

C. In addition to 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 fixtures, equipment, valves and specialties.
6. Manufacturers' installation, operation and maintenance recommendations for fixtures, equipment, valves and specialties.
7. Valve schedules.
8. Lubrication instructions, including parts list and frequency of lubrication.
9. Warranties.
10. Additional information as indicated in technical specification sections.

1.11 TRAINING OF OWNER PERSONNEL

A. Instruct Owner personnel in proper operation and maintenance of systems and equipment provided as part of this project.

B. Include not less than 4 hours of instruction, using Operation and Maintenance manuals during this instruction.

C. Demonstrate startup, operation, and shutdown procedures for all equipment. All training to be during normal working hours. Videotape all instructions and provide Owner with copy.

1.12 RECORD DRAWINGS

A. Division 01 - General Requirements: Record drawings.

1.13 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years experience, and with service facilities within 100 miles of Project.

B. Installer: Company specializing in performing Work of this section with minimum five years experience.

1.14 PRE-INSTALLATION MEETINGS

A. Division 01- General Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.15 DELIVERY, STORAGE, AND HANDLING

A. Division 01 – General Requirements: Product storage and handling requirements.

B. Deliver and store valves in shipping containers, with labeling in place.

C. Furnish cast iron and steel valves with temporary protective coating.

D. Furnish temporary end caps and closures on piping and fittings. Maintain in place until installation.

1.16 WARRANTY

A. Division 01 – General Requirements: Product warranties and product bonds.

B. Furnish one year manufacturer warranty for basic fire suppression materials and methods.

1.17 EXTRA MATERIALS

A. Division 01 – General Requirements: Spare parts and maintenance products.

PART 2 - PRODUCTS

2.1 VALVES

A. Manufacturers:
1. Claval
2. Viking
3. Reliable
4. Substitutions: In accordance with Division 01 – General Requirements.

B. Gate Valves:
1. Up to and including 2 inches: Bronze body and trim, rising stem, hand wheel, solid wedge or disc, threaded ends.
2. Over 2 inches: Iron body, bronze trim, rising stem pre-grooved for mounting tamper switch, hand wheel, OS&Y, solid bronze or cast iron wedge, flanged or grooved ends.
3. Over 4 inches: Iron body, bronze trim, non-rising stem with bolted bonnet, solid bronze wedge, flanged ends, iron body indicator post assembly.

C. Globe or Angle Valves:
1. Up to and including 2 inches: Bronze body, bronze trim, rising stem and hand wheel, inside screw, renewable rubber disc, threaded ends, with back seating capacity.
2. Over 2 inches: Iron body, bronze trim, rising stem, hand wheel, OS&Y, plug-type disc, flanged ends, renewable seat and disc.

D. Ball Valves:
1. Up to and including 2 inches: Bronze two piece body, brass, chrome plated bronze, or stainless steel ball, teflon seats and stuffing box ring, lever handle and balancing stops, threaded ends with union.
2. Over 2 inches: Cast steel body, chrome plated steel ball, teflon seat and stuffing box seals, lever handle or gear drive hand wheel for sizes 10 inches and over, flanged.

E. Butterfly Valves:
1. Bronze Body: Stainless steel disc, resilient replaceable seat, threaded or grooved ends, extended neck, hand wheel and gear drive and integral indicating device, and built-in tamper proof switch rated 10 amp at 115 volt AC.
2. Cast or Ductile Iron Body: Cast or ductile iron, chrome or nickel plated ductile iron or aluminum bronze disc, resilient replaceable EPDM seat, wafer, lug, or grooved ends. With extended neck, hand wheel and gear drive and integral indicating device, and internal tamper switch rated 10 amp at 115 volt AC.

F. Check Valves:
1. Up to and including 2 inches: Bronze body and swing disc, rubber seat, threaded ends.
2. Over 2 inches: Iron body, bronze trim, swing check with rubber disc, renewable disc and seat, flanged ends with automatic ball check.
3. 4 inches and Over: Iron body, bronze disc with stainless steel spring, resilient seal, threaded, wafer, or flanged ends.

G. Drain Valves:
1. Compression Stop: Bronze with hose thread nipple and cap.

2. Ball Valve: Brass with cap and chain, 3/4 inch hose thread.

2.2 BURIED PIPING

A. Steel Pipe: ASTM A53, Grade B, ASTM A135, ASTM A795, or ASME B36.10, Schedule 40 galvanized, with ASME C105 polyethylene jacket, or double layer, half-lapped 10 mil polyethylene tape.
   1. Steel Fittings: ASME B16.9, wrought steel, butt welded; ASME B16.25, butt weld ends; ASTM A234, wrought carbon steel and alloy steel; ASME B16.5, steel flanges and fittings; ASME B16.11, forged steel socket welded and threaded; with double layer, half-lapped 10 mil polyethylene tape.
   2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings.
   3. Joints: AWS D1.1, welded.
   4. Casing: Polyurethane insulation with high density polyethylene jacket and heat shrink sleeves.

B. Copper Tubing: ASTM B75, ASTM B88, or ASTM B251, Type K annealed.
   1. Fittings: ASME B16.18, cast copper alloy, or ASME B16.22, wrought copper and bronze, solder joint, pressure type.
   2. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze or ASTM B32, solder, Grade 95TA.
   3. Casing: Polyurethane insulation with high density polyethylene jacket and heat shrink sleeves.

C. Cast Iron Pipe: AWWA C151.
   1. Fittings: AWWA C110, standard thickness.
   2. Joints: AWWA C111, rubber gasket.
   3. Mechanical Couplings: Shaped composition sealing gasket, steel bolts, nuts, and washers.

2.3 ABOVE GROUND PIPING

A. Steel Pipe: ASTM A53, Grade B; ASTM A135; ASTM A135 UL listed, threadable, light wall; ASTM A795; or ASME B36.10; Schedule 10 galvanized.
   1. Steel Fittings: ASME B16.9, wrought steel, butt welded; ASME B16.25, butt weld ends; ASTM A234, wrought carbon steel and alloy steel; ASME B16.5, steel flanges and fittings; ASME B16.11, forged steel socket welded and threaded.
   2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings; ASME B16.4, threaded fittings.
   3. Malleable Iron Fittings: ASME B16.3, threaded fittings.
   4. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
   5. Mechanical Formed Fittings: Carbon-steel housing with integral pipe stop and O-ring pocked and O-ring uniformly compressed into permanent mechanical engagement onto pipe.

B. Copper Tubing: ASTM 75; ASTM B88; or ASTM B251; Type L, hard drawn.
   1. Fittings: ASME B16.18 cast copper alloy, or ASME B16.22, wrought copper and bronze, solder joint, pressure type.
   2. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 silver braze.

C. Copper Tubing: ASTM B88, Type L, hard drawn.
   1. Fittings: ASME B16.18 cast copper alloy, or ASME B16.22, wrought copper and bronze, grooved.
   2. Mechanical Grooved Couplings: Ductile iron housing with alkyd enamel paint coating clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers.

2.4 PIPE HANGERS AND SUPPORTS

A. Conform to NFPA 13 and NFPA 14.

B. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.

C. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.

D. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.

E. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.

F. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.

G. Vertical Support: Steel riser clamp.

H. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

I. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

PART 3 - EXECUTION

3.1 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.

3.2 INSTALLATION

A. Install piping in accordance with NFPA 13 for sprinkler systems, NFPA 14 for standpipe and hose systems, and NFPA 24 for service mains.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, to not interfere with use of space and other work.

D. Group piping whenever practical at common elevations.

E. Install pipe sleeve at piping penetrations through footings, partitions, walls, and floors. Seal pipe and sleeve penetrations to maintain fire resistance equivalent to fire separation.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

G. Pipe Hangers and Supports:
   1. Install in accordance with NFPA 13 and NFPA 14.
   2. Install hangers to with minimum 1/2 inch space between finished covering and adjacent work.
   3. Place hangers within 12 inches of each horizontal elbow.
   4. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   5. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
   6. Where installing several pipes in parallel and at same elevation, provide multiple or trapeze hangers.
   7. Install copper plated hangers and supports for copper piping.
   8. Prime coat exposed steel hangers and supports. Refer to Division 09 – Finishes. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.

H. Slope piping and arrange systems to drain at low points. Install 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. Refer to Section 09 90 00 – Painting and Coating.

J. Do not penetrate building structural members unless indicated.

K. Where more than one piping system material is specified, install compatible system components and joints. Install flanges, union, and couplings at locations requiring servicing.

L. Die cut threaded joints with full cut standard taper pipe threads with red lead and linseed oil or other non-toxic joint compound applied to male threads only.

M. Install valves with stems upright or horizontal, not inverted. Remove protective coatings prior to installation.

N. Install gate, ball or butterfly valves for shut-off or isolating service.

O. Install drain valves at main shut-off valves, low points of piping and apparatus.

P. Where inserts are omitted, drill through concrete slab from below and install through-bolt with recessed square steel plate and nut above slab.

3.3 INTERFACE WITH OTHER PRODUCTS

A. Inserts:
1. Install inserts for placement in concrete forms.
2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Install hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.4 CLEANING

A. Division 01 – General Requirements: Final cleaning.

B. Clean entire system after other construction is complete.

END OF SECTION

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SECTION 21 08 00

COMMISSIONING OF FIRE PROTECTION SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Fire Protection commissioning description.
2. Fire Protection commissioning responsibilities.

B. Related Sections:
1. Applicable provisions of Division 01 – General Requirements shall govern Work under this Section.
2. Section 21 05 00 – Basic Fire Protection Materials and Methods.
3. Division 01 – General Requirements – General Commissioning Requirements.
4. Division 22 – Plumbing Systems: Fire suppression systems commissioning requirements.
5. Division 23 – Heating, Ventilating and Air Conditioning: For requirements and procedures concerning testing, adjusting, and balancing of mechanical systems.
6. Division 25 – Integrated Automation: Submittal, training, and programming requirements.
7. Division 26 – Electrical: Electrical systems commissioning requirements.

1.2 REFERENCES

A. Associated Air Balance Council: (AABC)
1. AABC - ACG Commissioning Guideline.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers: (ASHRAE)
1. ASHRAE Guideline 0 - The HVAC Commissioning Process.

C. BCA (Building Commissioning Association) Commissioning Handbook.

D. National Fire Protection Association: (NFPA)
1. NFPA 3 – Commissioning and Integrated Testing Handbook.
2. NFPA 4 – Standard on Integrated Testing.

1.3 COMMISSIONING DESCRIPTION

A. Commissioning:
1. Commissioning is a quality-oriented process for achieving, verifying, and documenting that performance of facilities, systems, and assemblies meet defined objectives and criteria.
2. Commissioning process begins at project inception (during pre-design phase) and continues through the life of facility.
3. Commissioning process includes specific tasks to be conducted during each phase in order to verify that design, construction, and training meets Owner's Project Requirements.

B. Commissioning Team:
1. Members of commissioning team consist of:

a. Commissioning Authority (CxA).
b. Owner's Representative/Construction Manager (CM).
c. General Contractor (GC).
d. Architect and Design Engineers.
e. Fire Protection Contractor (FPC).
f. Plumbing Contractor (PC).
g. Mechanical Contractor (MC).
h. Electrical Contractor (EC).
i. Testing and Balancing (TAB) Contractor.
j. Control Contractor (CC).
k. Facility Operating Staff.
l. Other installing subcontractors or suppliers of equipment.

2. CxA directs and coordinates project commissioning activities and reports to Owner.
3. All team members work together to fulfill their contracted responsibilities and meet objectives of the Contract Documents.

C. Fire Protection commissioning process includes the following tasks:
1. Testing and startup of fire protection equipment and systems.
2. Equipment and system verification checks.
3. Assistance in functional performance testing to verify testing and balancing, and equipment and system performance.
4. Provide qualified personnel to assist in commissioning tests.
5. Complete and endorse functional performance test checklists provided by Commissioning Authority to assure equipment and systems are fully operational and ready for functional performance testing.
6. Provide equipment, materials, and labor necessary to correct deficiencies found during commissioning process to fulfill contract and warranty requirements.
7. Provide operation and maintenance information and record drawings to Commissioning Authority for review verification and organization, prior to distribution.
8. Assist Commissioning Authority to develop, edit, and document system operation descriptions.
9. Provide training for systems specified in this Section with coordination by Commissioning Authority.
10. Coordination with local fire department and authority having jurisdiction for their specific testing requirements.

D. Equipment and Systems to be Commissioned:
1. Sprinkler fire protection water distribution piping.
2. Fire hose cabinets and stand pipes.
3. Integrated systems testing.
4. Deluge fire suppression systems.

1.4 CLOSEOUT SUBMITTALS

A. Division 01 - General Requirements: Shop drawings, product data and samples.

B. Division 01 – General Requirements: Requirements for submittals.

C. Division 01 – General Requirements: Record revisions to equipment and system documentation necessitated by commissioning.

D. Division 01 – General Requirements: Submit revisions to operation and maintenance manuals for necessary revisions discovered during commissioning.

1.5 COMMISSIONING RESPONSIBILITIES

A. Equipment or System Installer Commissioning Responsibilities:
1. Attend commissioning meetings.
2. Ensure temperature controls installer performs assigned commissioning responsibilities as specified below.
3. Ensure testing, adjusting, and balancing agency performs assigned commissioning responsibilities as specified.
4. Provide instructions and demonstrations for Owner's personnel.
5. Ensure subcontractors perform assigned commissioning responsibilities.
6. Ensure participation of equipment manufacturers in appropriate startup, testing, and training activities when required by individual equipment specifications.
7. Develop startup and initial checkout plan using manufacturer’s startup procedures and functional performance checklists for commissioned equipment and systems.
8. During verification check and startup process, execute fire protection related portions of checklists for commissioned equipment and systems.
9. Perform and document completed startup and system operational checkout procedures, providing copy to Commissioning Authority.
10. Provide manufacturer’s representatives to execute starting of equipment. Ensure representatives are available and present during agreed upon schedules and attend for duration to complete tests, adjustments, and problem solving.
11. Coordinate with equipment manufacturers to determine specific requirements to maintain validity of warranties.
12. Provide personnel to assist Commissioning Authority during equipment or system verification checks and functional performance tests.
13. Prior to functional performance tests, review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits used during tests.
14. Prior to startup, inspect, check, and verify correct and complete installation of equipment and system components for verification checks included in commissioning plan.
15. When deficient or incomplete work is discovered, ensure to take corrective action and re-check until equipment or system is ready for startup.
16. Coordinate work with manufacturer and Commissioning Authority.
17. Perform verification checks and startup on equipment and systems as specified.
18. Assist Commissioning Authority in performing functional performance tests on equipment and systems as specified.
19. Perform operation and maintenance training sessions scheduled by Commissioning Authority.
20. Conduct fire protection system orientation and inspection.

B. Temperature Controls Installer Commissioning Responsibilities:
1. Perform training sessions to instruct Owner's personnel in hardware operation, software operation, programming, and application in accordance with commissioning plan and requirements.

2. Demonstrate system performance and operation to Commissioning Authority and AHJ during functional performance tests including each mode of operation.
3. Provide control system technician to assist during Commissioning Authority verification check and functional performance testing.
4. Provide control system technician to assist testing, adjusting, and balancing agency during performance of testing, adjusting, and balancing work.
5. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

C. Testing, Adjusting, and Balancing Agency Commissioning Responsibilities:
1. Attend commissioning meetings.
2. Participate in verification of testing, adjusting, and balancing report for verification or diagnostic purposes. Repeat sample of 10 percent of measurements contained in testing, adjusting, and balancing report as selected by Commissioning Authority.
3. Assist in performing operation and maintenance training sessions scheduled by Commissioning Authority.

1.6 COMMISSIONING MEETINGS

A. Division 01 – General Requirements: Requirements for commissioning meetings.

B. Attend initial commissioning meeting and progress commissioning meetings as required by Commissioning Authority.

1.7 SCHEDULING

A. Division 01 – General Requirements: Requirements for scheduling.

B. Prepare schedule indicating anticipated start dates for the following:
1. Piping system pressure testing.
2. Piping system flushing and cleaning.
3. Equipment and system startups.
4. Fire Protection system orientation and inspections.
5. Operation and maintenance manual submittals.
6. Training sessions.

C. Schedule tests of equipment and systems during peak design conditions to observe full-load performance.

D. Schedule occupancy sensitive tests of equipment and systems during conditions of both minimum and maximum occupancy or use.

1.8 COORDINATION

A. Division 01 – General Requirements: Requirements for coordination.

B. Notify Commissioning Authority minimum of four weeks in advance of the following:
1. Scheduled equipment and system startups.
2. Scheduled start of testing, adjusting, and balancing work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 FUNCTIONAL TESTING

A. Place systems and equipment into full operation and continue operation during commissioning.

3.2 COMMISSIONING

A. Seasonal Sensitive Functional Performance Tests:
   1. Test equipment at design conditions where possible.
   2. Participate in testing delayed beyond Final Completion to test performance at peak seasonal conditions.

B. Be responsible to participate in initial and alternate peak season test of systems required to demonstrate performance.

C. Occupancy Sensitive Functional Performance Tests:
   1. Test equipment and systems affected by occupancy variations at minimum and peak loads to observe system performance.
   2. Participate in testing delayed beyond Final Completion to test performance with actual occupancy conditions.

3.3 CONSTRUCTION VERIFICATION CHECKLISTS

A. Complete the following construction verification checklists for this project. Submit to CxA for review and approval.
   1. CV-21 10 00: Water-Based Fire Suppression System.

END OF SECTION

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SECTION 21 12 00

FIRE-SUPPRESSION STANDPIPES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
1. Standpipe system.
2. Fire department connection.

B. Related Sections:
1. Applicable provisions of Division 01 shall govern all work under this Section.
2. Division 10 – Specialties: Fire extinguishers, cabinets, and accessories.
3. Section 21 05 00 – Basic Fire Suppression Materials and Methods.
4. Section 21 13 13 – Wet-Pipe Sprinkler Systems.
5. Section 22 05 53 – Identification for HVAC Piping and Equipment.
6. Division 26 - Equipment Wiring Systems: Electrical characteristics and wiring connections.

1.2 REFERENCES

A. Factory Mutual (FM):
1. FM - Factory Mutual Approval Guide.

B. Intertek Testing Services (Warnock Hersey) (WH):
1. Warnock Hersey - Certification Listings.

C. National Fire Protection Association (NFPA):
1. NFPA 10 - Standard for Portable Fire Extinguishers.
2. NFPA 14 - Standard for Installation of Standpipe, Private Hydrants, and Hose Systems.

D. Underwriters' Laboratories, Inc. (UL):
1. UL - Fire Protection Equipment Directory.

1.3 SUBMITTALS FOR REVIEW

A. Division 01 – General Requirements: Procedures for submittals.

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. Submit shop drawings and product data to Owner's insurance underwriter for approval. Submit proof of approval to Engineer.

1.4 SUBMITTALS AT PROJECT CLOSEOUT

A. Division 01 – General Requirements: Procedures for submittals.

B. Project Record Documents: Record actual locations of components.

C. Operation Data: Include manufacturer's data.

D. Maintenance Data: Include servicing requirements and test schedule.

E. Certificates: Provide certificate of compliance from authority having jurisdiction indicating approval of field acceptance tests.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 14.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.

1.6 PRE-INSTALLATION MEETING

A. Division 01 – General Requirements: Pre-installation meeting.

B. Convene one week before starting work of this section.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Division 01 – General Requirements: Transport, handle, store, and protect products.

B. Deliver and store products in shipping packaging until installation.

1.8 EXTRA MATERIALS

A. Division 01 – General Requirements.

PART 2 - PRODUCTS

2.1 VALVES

A. Hose Connection Valve: Angle type; brass 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.

2.2 FIRE DEPARTMENT CONNECTION

A. Type: Flush mounted wall type with brass finish.

B. Outlets: Two way with thread size to suit fire department hardware; threaded dust cap and chain of matching material and finish.

C. Drain: 3/4 inch automatic drip, outside.

D. Label: "Dry Standpipe - Fire Department Connection".

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 14.

C. Locate hose station valve in cabinet at 60 inches above floor. Locate hose connection valve below hose station valve and not closer than 4 inches from side or bottom of cabinet.

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.

3.2 FIELD QUALITY CONTROL

A. Division 01 – General Requirements: Field inspection, testing, and adjusting.

B. Test entire system in accordance with NFPA 14.

C. Test shall be witnessed by authority having jurisdiction.

END OF SECTION

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SECTION 21 13 13

WET-PIPE FIRE SUPPRESSIONSPRINKLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wet-pipe sprinkler system, system design, installation, and certification.

B. Related Sections:
   1. Applicable provisions of Division 01 shall govern all work under this Section.
   2. Section 21 05 00 – Basic Fire Suppression Materials and Methods.
   3. Section 22 05 53 – Identification for Plumbing Piping and Equipment: Product requirements for valve and piping identification for placement by this section.
   4. Division 26 – Wiring Connections: Execution requirements for electric connections to equipment specified by this section.

1.2 REFERENCES

A. National Fire Protection Association (NFPA):
   1. NFPA 13 - Installation of Sprinkler Systems.

1.3 SYSTEM DESCRIPTION

A. System to provide coverage for building areas noted.

B. Provide hydraulically designed system to NFPA 13 Ordinary Hazard, Group 1 occupancy requirements.

C. Determine volume and pressure of incoming water supply from water flow test data. When not available, assume 1000 gpm at 50 psig. Revise design when test data become available prior to submittals.

D. Interface system with building fire and smoke alarm system.

E. Provide fire department connections as indicated on Drawings.

1.4 SUBMITTALS

A. Division 01 - General Requirements: Submittal procedures.

B. Shop Drawings:
   1. Indicate layout of finished ceiling areas indicating sprinkler locations coordinated with ceiling installation.
   2. Indicate detailed pipe layout, hangers and supports, sprinklers, components and accessories.
   3. Indicate system controls.

C. Product Data:

1. Submit data on sprinklers, valves, and specialties, including manufacturers catalog information.
2. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

D. Samples: Submit two of each style of sprinkler specified.

E. Design Data: Submit design calculations; signed and sealed by professional engineer licensed in the State of Wisconsin.

F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 CLOSEOUT SUBMITTALS

A. Division 01 – General Requirements: Closeout procedures.

B. Project Record Documents: Record actual locations of sprinklers and deviations of piping from drawings. Indicate drain and test locations.

C. Operation and Maintenance Data: Submit components of system, servicing requirements, record drawings, inspection data, replacement part numbers and availability, and location and numbers of service depot.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with NFPA 13.

B. Perform Work in accordance with state and local building codes.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years experience.

B. Installer: Company specializing in performing Work of this section with minimum five years experience.

C. Design system under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Wisconsin.

1.8 PRE-INSTALLATION MEETINGS

A. Division 01 – General Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Division 01 – General Requirements: Product storage and handling requirements.

B. Store products in shipping containers until installation.

C. Furnish piping with temporary inlet and outlet caps until installation.

1.10 WARRANTY

A. Division 01 – General Requirements: Product warranties and product bonds.

B. Furnish one year manufacturer warranty.

1.11 EXTRA MATERIALS

A. Division 01 – General Requirements: Spare parts and maintenance products.

B. Furnish extra sprinklers under provisions of NFPA 13.

C. Furnish suitable wrenches for each sprinkler type.

D. Furnish metal storage cabinet located adjacent to alarm valve.

PART 2 - PRODUCTS

2.1 SPRINKLERS

A. Manufacturers:
1. Automatic Sprinkler Corp.
2. Grinnell Corp.
3. Reliable Sprinkler Corp.
4. WSA Inc.
5. Substitutions: In accordance with Division 01 – General Requirements.

B. Exposed Area Type:
1. Type: Standard upright type.
2. Finish: Brass.
3. Fusible Link: Glass bulb type temperature rated for specific area hazard.

C. Guards: Finish to match sprinkler finish.

2.2 PIPING SPECIALTIES

A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm and electric alarm, with pressure retard chamber and variable pressure trim; with test and drain valve.

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 mounted wall type with brass finish.
   2. Outlets: Two-way with fire department thread size. Threaded dust-cap and chain of matching material and finish.
   3. Drain: 3/4 inch automatic drip, outside.
   4. Label: "Sprinkler - Fire Department Connection"

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install in accordance with NFPA 13.

B. Install buried shut-off valves in valve box. Furnish post indicator.

C. Install approved double check valve assembly at sprinkler system water source connection.

D. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent Siamese connectors to allow full swing of fire department wrench handle.

E. Locate outside alarm-gong on building wall as indicated on Drawings.

F. Place pipe runs to minimize obstruction to other work.

G. Install piping in concealed spaces above finished ceilings.

H. Center sprinklers in two directions in ceiling tile and install piping offsets.

I. Install guards on sprinklers as indicated on Drawings.

J. Hydrostatically test entire system.

K. Require test be witnessed by Authority having jurisdiction.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Verify signal devices are installed and connected to fire alarm system.

3.3 CLEANING

A. Division 01 – General Requirements: Final cleaning.

B. Flush entire piping system of foreign matter.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

A. Division 01 – General Requirements: Protecting installed construction.

B. Apply masking tape or paper cover to protect concealed sprinklers, cover plates, and sprinkler escutcheons not receiving field paint finish. Remove after painting. Replace painted sprinklers with new.

END OF SECTION

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