PROJECT MANUAL FOR #2023-02

Rock County - Orfordville Salt Shed
Rock County Department of Public Works
734 W. Beloit Street
Orfordville, WI 53576

January 31, 2023

ANGUS-YOUNG
ARCHITECTS/ENGINEERS

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#2023-02
Rock County - Orfordville Salt Shed
Rock County Department of Public Works
734 W. Beloit Street
Orfordville, WI 53576

A/E Project No. 74660

ARCHITECT

Angus-Young Associates, Inc.

Janesville Office
555 South River Street
Janesville, Wisconsin 53548-4783
608.756.2326

www.angusyoung.com

ANGUS-YOUNG
ARCHITECTS/ENGINEERS

January 31, 2023

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END OF SECTION

ROCK COUNTY, WISCONSIN

PURCHASING DIVISION
FINANCE DIRECTOR

#2023-02
INVITATION TO BID
ROCK COUNTY PUBLIC WORKS
ORFORDVILLE SALT SHED
FOR
FACILITIES MANAGEMENT
ROCK COUNTY, WISCONSIN

Bids due in Rock County Purchasing Division by:
March 1, 2023 – 2:00 p.m.

Bids received after this date and time will be rejected. Bids must remain in effect for the life of the contract period. Address

Bid to: Sarah Smith Purchasing Specialist
Rock County Purchasing Division
Rock County Courthouse
51 S. Main Street
Janesville WI. 53545

****MARK SEALED ENVELOPE: #2023-02 – ORFORDVILLE SALT SHED BID****

Rock County reserves the right to accept or reject any or all bids; to waive any technicality or error in any bid or part therein, and to accept the same or combinations, in whole or in part, whichever is deemed to be in the best interest of Rock County.

Contracts are awarded to the lowest, most qualified, responsible and responsive bidder on the basis of the base bid and full consideration of any or all alternatives, as may be in the best interest of Rock County. In determining the award of contract, Rock County will consider the scope of the work involved, time of delivery, competency of bidder, bidder's ability to render satisfactory service, and past performance. If two or more bidders submit identical bids, Rock County will make award to bidder of its choice and such decision will be final.

INSTRUCTIONS FOR BID

Bidders are required to submit their bid either via Demandstar, or in a sealed envelope marked ITB #2023-02 to Sarah Smith, Purchasing Division, 51 South Main, Janesville, WI 53545. All bids must be received by **2:00 p.m. (local time), March 1, 2023.** Any bid submitted after this date and time will be rejected. Vendors are responsible for ensuring that the above office receives their bid before the deadline. No faxed bids will be accepted.

Bids shall be signed with name printed below signature. Where Bidder is a Corporation, Bid must be signed with the legal name of the Corporation followed by the legal signature of an officer authorized to bind the Corporation to contract.

Bidders must be licensed to do business in the State of Wisconsin when required by law.

INQUIRIES

All questions concerning this Invitation to Bid shall be submitted **in writing** to Sara Smith, Purchasing Specialist. Questions shall be received by **12:00 noon (local time), February 22, 2023**. Questions received after this date and time will not be answered. Questions shall be e-mailed to sarah.smith@co.rock.wi.us

No verbal explanation or instructions will be given in regard to the meaning of the drawings or specifications during the bid period. Bidders shall bring inadequacies, omissions or conflicts to Rock County's attention in writing by the question cut-off date and time. If necessary, answers to questions will be provided to all specification holders in the form of an addendum. Addendum will include a list of each question received and Rock County's response.

ADDENDA

All changes in or interpretations of the Bidding Documents prior to bid opening will be made by written addenda issued by Rock County and posted in Demandstar and on the Rock County's website (www.co.rock.wi.us) All addendas will be issued no later than 72 hours prior to bid opening.

PROJECTED TIMETABLE

Vendors not involved in the final selection process will be notified in writing. The above schedule is for informational purposes only and is in no way binding upon Rock County.

Issue Invitation to Bid -01/31/2023
Pre-Bid Conference -02/15/2023 – 9:00a.m.
Questions Due -02/22/2023 – 12:00 noon
Amendments Issued by- 02/24/2023 – 5:00p.m.
Bids Due 03/01/2022 – 2:00p.m.
Governing Committee Approval 03/21/2023
County Board Approval 03/23/2023

CONSTRUCTION SCHEDULE

It is Ownership's desire to have the work completed prior to the end of 2023, but the project documents don't list a specific required completion date or liquidated damages. Bidders shall indicate their estimated lead times for starting and completing the work, in the spaces provided on the bid form. This information will be taken into consideration when reviewing bids and awarding the work.

VENDOR SUPPLIED DOCUMENTATION AND MATERIALS

All vendor-supplied materials, including the vendor's bid, become the property of Rock County. We will work with vendors to meet their confidentiality requirements, provided that they are within reason. All vendor confidential material must have each page clearly marked as confidential. Wisconsin "Open Records Laws" apply. Rock County's determination to treat matters as public or confidential under the Wisconsin Open Records Law shall be final.

BID AND PRESENTATION COSTS

Rock County will not be liable in any way for any costs incurred by the offerors in the presentation of their Bid in response to this Invitation to Bid nor for the presentation of their Bid and/or participation in any discussions or negotiations.

COMPLIANCE WITH INVITATION TO BID

Bids submitted shall be in strict compliance with the Invitation to Bid. Failure to comply with all provisions on the ITB may result in disqualification. Failure to visit the site or failure to examine any and all Contract Documents will in no way relieve the successful Bidder from necessity of furnishing any materials or equipment, or performing any work, that may be required to complete the work in accordance with the drawings and specifications. Neglect of the above requirements will not be accepted as reason for the delay in the work or additional compensation.

IMPLIED REQUIREMENTS

Products and services that are not specifically addressed in this Invitation to Bid, but which are necessary to provide functional capabilities proposed by the offeror, must be included in the bid.

NON-DISCRIMINATION

In connection with the performance of work under this contract, the contractor agrees not to discriminate against any employee or applicant for employment because of age, race, religion, color, handicap, sex, physical condition, developmental disability as defined in s.51.01 (5)(a), sexual orientation, national origin, or military service as defined in §111.355(1), Wis. Stats. This provision shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor further agrees to take affirmative action to ensure equal employment opportunities. The contractor agrees to post in conspicuous places, available for employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause (Wisconsin Statutes S.16.765 (2).

INDEMNIFICATION

The contractor to perform services for Rock County shall indemnify, hold harmless, and defend Rock County, its officers, agents, and employees from any and all liability including claims, demands, losses, costs, damages and expenses of any kind and description or damage to person or property arising out of or in connection with or occurring during the course of any agreement between the contractor and Rock County where such liability is founded upon or grows out of the acts, omissions, negligence or misconduct of any agents or employees of the contractor.

TBE PARTICIPATION

Not required.

BID BOND AND PERFORMANCE & PAYMENT BOND

Not required.

INSURANCE REQUIREMENTS

The Contractor further agrees that in order to protect itself and County it will at all times during the term of this agreement keep in force and effect worker's compensation, comprehensive general, and auto liability insurance policies by a company or companies authorized to do business in Wisconsin with limits of:

Personal and bodily injury	Per person	$1,000,000
	Per accident	$2,000,000
Property damage:	Each Occurrence	$500,000
	Aggregate	$500,000

Coverage shall apply as primary with County named as an additional named insured. Contractor shall also provide a copy of the additional insured endorsement. Contractor shall furnish satisfactory proof of insurance to County prior to the date of Contract Execution, or commencing work for the County.

MODIFICATION AND WITHDRAWAL

Bids may not be modified after submittal. Bidders may withdraw Bids at any time before the Bid opening, but may not resubmit them. No Bid may be withdrawn or modified after the Bid opening except where the award of Contracts has been delayed for more than 60 days from the day of the Bid opening.

PROOF OF COMPETENCY OF BIDDER

Any Bidder may be required to furnish evidence satisfactory to Rock County that the Bidder and proposed subcontractors have sufficient means, expertise, financial ability, and experience in the types of work bid to assure completion of the Contract in a satisfactory manner.

CONFLICT OF INTEREST

All respondents must disclose with their Bid, the name of any officer, director or agent who is also an officer or employee of Rock County. Further, all respondents must disclose the name of any Rock County officer or employee who owns, directly or indirectly, any interest in the vendor's firm or any of its branches. Failure to disclose this information will result in disqualification of Bid and/or cancellation of Contract. Rock County reserves the right to seek damages for recoupment of losses in having to re-let or reassign.

QUANTITIES

Quantities shown within the Invitation to Bid are based upon estimated needs. The County reserves the right to increase or decrease quantities to meet actual needs or availability of funds.

QUALITY LEVEL

Unless otherwise indicated in the Invitation to Bid, all materials shall be first quality. Items which are used, obsolete, or which have been discontinued are unacceptable without prior written approval by Rock County.

DEVIATION AND EXCEPTIONS

Deviations and exceptions from terms, conditions, or specifications will be described fully under the bidder's letterhead, signed, and attached to the Bid. In the absence of such statements, the bid will be accepted as in strict compliance with all terms, conditions, and specifications and the bidder shall be held liable.

SUBSTITUTIONS

When substitutions are bid, they must be identified by manufacturer, stock number, and other descriptive information to establish equivalencies. Rock County shall be the sole judge of equivalency.

DISQUALIFICATION

Rock County reserves the right to disqualify Bids, before and after opening upon evidence of collusion with the intent to defraud or other illegal practices upon the part of the Bidder.

DEBARMENT

The Contractor certifies through signing their Bid that neither the Contractor nor any of its principals are debarred, suspended, proposed for debarment or declared ineligible by any federal department or agency. In addition, the Contractor shall notify Rock County within five business days in writing by registered mail if the Contractor or its principals receive a designation from the federal government that they are debarred, suspended, proposed for debarment, or declared ineligible by a federal agency.

REQUEST FOR CLARIFICATION

All requests by Rock County for clarification of bids will be in writing. Such requests shall not alter the offeror's pricing information contained in its bid.

SAFETY REQUIREMENTS

Materials, equipment and supplies provided to the County shall comply fully with all safety requirements that are set forth by the Wisconsin Administrative Code, Rules of the Industrial Commission on Safety, and all applicable OSHA standards. When furnishing toxic or hazardous materials as defined in sub-part "Z" of the U. S. Occupational Safety and Health Standards, the contractor shall furnish OSHA Form 20, "Material Safety and Data Sheet", for each item provided. Further, during the course of performing the service necessary to satisfy the requirements of any Invitation to Bid, the contractor is fully liable for public and private protection while work is in progress or at any site exposed as a potential hazard. Contractor shall provide warning devices and/or signs, which shall be prominently installed and displayed, and be fully in compliance with safety regulations.

SUBSTANCE ABUSE POLICY

Pursuant to Wis. Stat. 103.503(3), contractor, subcontractor or agent of a contractor or subcontractor that will be performing any work on this public works project verifies that it has in place, prior to the commencement of any work on this project, a written program for the prevention of substance abuse among its employees. Said verification includes confirmation that the written program contains all of the following:

1. A prohibition against any employee using, possessing, attempting to possess, distributing, delivering, or being under the influence of a drug, or use or be under the influence of alcohol, while performing work on this project.
2. A requirement that employees performing work on this project shall submit to random, reasonable suspicion, and post-accident drug and alcohol testing and to drug and alcohol testing before commencing work on this project, except that testing of an employee before commencing work on this project is not required if the employee has been participating in a random testing program during the ninety (90) days preceding the date on which the employee commences work on this project.
3. A procedure for notifying an employee who tests positive or who refuses to submit to drug or alcohol testing that he/she may not perform work on this project or have access to this project until he/she has submitted to the required drug or alcohol testing and does not test positive.

Rock County is not responsible for the cost of developing, implementing or enforcing this required substance abuse prevention program in any way; nor is it responsible for the cost of drug and alcohol testing any employee. Each employer shall be responsible for said costs.

AWARD

Award will not be made to any Bidder in default of a Contract with Rock County, or to any Bidder having as its agent or employee, any individual previously in default or guilty ofmisrepresentation.

TAXES

Rock County is exempt from the payment of all federal excise taxes, registration no. 41407 (For tax-free transactions under Chapter 32 of the Internal Revenue Code. The certificate of exemption is on file with the District Attorney, U. S. Treasury Department, Internal Revenue Service, Milwaukee, Wisconsin). Rock County is exempt from Wisconsin State and Local taxes on its purchases except Wisconsin excise tax as the Wisconsin Department of Revenue does not issue state exempt numbers to Counties per Wisconsin Statute 77.54 (9) (a). Contractors performing construction activities are required to pay state user tax on the cost of materials which they purchase. Rock County is required to pay an excise tax on Wisconsin beer, liquor, wine, cigarettes, tobacco products, motor vehicle fuel engine oil and aviation fuel.

CONTRACT

The documents that will form the contract include the "Invitation to Bid", any attachments or addendum and the successful respondent's “Bid".

APPLICABLE LAW

All contracts are governed under the laws of the State of Wisconsin and are made at Rock County, Wisconsin, and venue for any legal action to enforce the terms of the agreement will be in Rock County Circuit Court.

COMPLIANCE WITH LAWS

The Contractor shall give all notices required by and shall otherwise comply with all applicable laws, ordinances and codes and shall, at his own expense, secure and pay the fees and charges for all permits required for the performance of the contract. All materials furnished and work done is to comply with all local, state and federal laws and regulations.

TERMINATION FOR DEFAULT

The contract may be terminated by Rock County, in whole or in part, in writing, whenever the County determines that the Contractor has failed to meet performance requirements of the Contract.

TERMINATION FOR CONVENIENCE

Rock County reserves the right to terminate the Contract, in whole or in part, by giving the Contractor written notice of at least thirty (30) days prior to the effective date of the termination. Upon receipt of termination from Rock County, the Contractor shall only provide those services specifically approved or directed by Rock County. All other rights and duties of the parties under the Contract shall continue during such notice period.

CANCELLATION

Failure to maintain the required certificates of insurance, permits, licenses and bonds will be cause for contract termination. If the Contractor fails to maintain and keep in force the required insurance, Rock County shall have the right to cancel and terminate the contract withoutnotice.

Rock County reserves the right to cancel a purchasing contract in whole or in part without penalty due to the non-appropriation of funds or for failure of the contractor to comply with terms, conditions, and specifications of the contract. Any dispute arising as to quality and quantity is subject to arbitration as provided in Chapter 788, Wisconsin Statutes.

FORCE MAJEURE

Neither party to this agreement shall be liable to the other for any cost or damages if the failure to perform the Contract arises out of causes beyond the control and without the fault or negligence of the parties. Such causes may include, but are not restricted to, acts of God, fires, quarantine restriction, strikes and freight embargoes. In all cases, the failure to perform must be totally beyond the control and without fault or negligence of the party.

PERMITS, LICENSES AND FEES

The selected vendor shall be responsible for obtaining all permits, licenses, certifications etc. required by Federal, State, County and Municipal laws, regulations, codes and ordinance for the performance of the work required in these specifications and to conform with the requirements of said legislation.

PATENT FEES, ROYALTIES AND LICENSES

By accepting a contract or purchase order from Rock County, the vendor or contractor guarantees that the sale or use of the items or goods being provided will not infringe any United States patent, and covenants that it will at its own expense defend every suit which may be brought against Rock County, (provided that such party is promptly notified of such suit, and all papers therein are delivered to it) for any alleged infringement of any patent by reason of the sale or use of such article or articles, and agrees that it will pay all costs, damages and profits recoverable in such suit. The party selling to Rock County guarantees that the items or goods being provided were manufactured in accordance with applicable federal labor laws.

PUBLIC ENTITIES CRIMES

A person or affiliate that has been convicted of a public entity crime is not allowed to submit a Bid for this contract.

PUBLIC RELATIONS IMAGE

Selected vendor's personnel shall at all times handle complaints and any public contact with due regard to the County's relationship with the public. Any personnel in the employ of the selected vendor involved in the execution of work that is deemed to be conducting themselves in an unacceptable manner shall be removed from the contract at the request of Rock County.

PUBLICITY RELEASES

Contractor agrees not to refer to award of this contract in commercial advertising in such a manner as to state or imply that the products or services provided are endorsed or preferred by Rock County. The contractor shall not have the right to include the County's name in its published list of customers without prior approval of Rock County. The contractor further agrees not to publish or cite in any form, any comments or quotes from County staff.

ASSIGNMENT & SUBCONTRACTING

The selected Contractor will not be permitted to sublet, sell, transfer, assign or otherwise dispose of the contract or any portion therein, or its right, title or interest in, to any person, firm or corporation without the written consent of Rock County.

VENDOR'S RELATIONSHIP TO ROCK COUNTY

It is expressly agreed and understood that the successful vendor is in all respects an Independent Contractor as to the work, and the vendor is in no respect an agent, servant or employee of Rock County. The contract will specify the work to be done by the vendor, but the method utilized to accomplish the work shall be the responsibility of the vendor.

DEFICIENCIES

In the event that Rock County determines that there are deficiencies in the service work provided by the vendor under the contract, Rock County shall notify the vendor in writing as to the precise nature of any such deficiencies. Within ten (10) working days of receipt of such notice, vendor shall take responsible steps to correct any deficiencies.

GUARANTEED DELIVERY

Failure of the contractor to adhere to the delivery schedule that is specified or to promptly replace rejected materials renders the contractor liable for all costs in excess of contract price if alternate procurement is necessary. Excess costs include administrative costs.

WORK CHANGES

Rock County reserves the right to order work changes in the nature of additions, deletions or modifications without invalidating the Contract.

WORK SITE DAMAGE

Any damage, including damage to finished surfaces, resulting from the performance of this contract shall be repaired to Rock County's satisfaction at the Contractor's expense.

RECORDS

The Contractor shall maintain accurate and complete records. All books and records pertaining to the performance of the contract shall be made available at any time during the contract and for three years following the expiration of said contract to the Rock County Finance Department, Purchasing Department or any independent auditing firm acting at the direction of Rock County.

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ROCK COUNTY, WISCONSIN

PURCHASING DIVISION
FINANCIAL SERVICES

#2023-02
INVITATION TO BID
ROCK COUNTY PUBLIC WORKS
ORFORDVILLE SALT SHED
FOR
FACILITIES MANAGEMENT
ROCK COUNTY, WISCONSIN

BID FORM

TO: **County of Rock**
Financial Services / Purchasing Division
51 South Main Street
Janesville WI 53545

I (We) _____
(A Corporation) **(A Partnership)** **(An Individual)**

A Bona Fide Prime Bidder, have received the specifications prepared by Rock County for the above referenced project. I (We) have also received Addenda Nos_____, and have included their provisions in this Bid.

I (We) have examined the Specification Documents noted above, and agree to enter into and execute a contract, if awarded, on the basis of this Bid.

I (We) will perform all the work for the stipulated sum of:

BASE BID **$**_____

_____**dollars**

Estimated Start Date: _____

Estimated Completion Date: _____

List any deviations or additional information to your bid on a company letterhead.

Bid prepared by: _____
Signature

_____
Print Name & Title

Company: _____

Address: _____

_____

E-Mail Address: _____

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SECTION 00 43 25
SUBSTITUTION REQUEST FORM

To: Bradley Werginz, AIA, Principal, Architect
Angus-Young Associates, Inc.
555 South River Street
Janesville, Wisconsin 53548-4783

Project: Rock County - Orfordville Salt Shed

A/E Project No.: 74660

Date Received: _____

Specification Section Number and Paragraph:_____

Drawings and details affected:_____

Proposed Substitution:_____

Manufacturer:_____

Product (model, pattern, etc.):_____

WHY IS SUBSTITUTION BEING SUBMITTED? (Select one of the following):

- ☐ Pre-Bid Substitution (Prior Approval) Bid Date:
- ☐ Specified product is not available. Explain
- ☐ Cost savings to Owner. Attach comparative cost analysis and proposed deduct.
- ☐ Other. Explain.

EFFECTS OF PROPOSED SUBSTITUTION Answer the following questions and attach explanations.

Does substitution affect dimensions indicated on Drawings?
(NO) (YES, explain)

Does substitution affect Work of other Sections?
(NO) (YES, explain)

Does substitution require modifications to design, changes to Drawings, or revisions to Specifications to be incorporated into the Project?
(NO) (YES, explain)

Attach list of at least three projects where proposed substitution has been used within past twelve months include name, address, and telephone number of Owner and Architect.

CONTRACTOR'S/BIDDER'S REPRESENTATION
Undersigned accepts responsibility for coordination of proposed substitution and accepts all additional costs resulting from the incorporation of proposed substitution into the Project per Section 01 25 13.

SUBMITTED BY:

_____

_____

For Architect's Use:

- ☐ Accepted
- ☐ Not Accepted
- ☐ No Action Required
- ☐ Submission: Incomplete
- ☐ Too Late

Reviewed by/Date: _____
Comments:_____

Subcontractor's signature and date: _____

Contractor's signature and date: _____

END OF SECTION

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SECTION 01 11 00
SUMMARY OF WORK

PART 1 - GENERAL

A. For determining the Scope of the Work, this Section shall be used in conjunction with the Drawings and with corresponding Sections of the Technical Specifications, Conditions of the Contract, and issued Addenda. This Project is being bid as a single bid package.

B. Under this bid package, Contractor shall provide the necessary trades, for which bids are asked including, but not necessarily limited to, furnishing all labor, materials, tools, and equipment necessary for the construction of the Rock County - Orfordville Salt Shed to be located at 734 W. Beloit Street in Orfordville, WI 53576. Base Bid will include a 92'x72' wood frame salt storage structure with cast-in-place concrete foundation t-walls, capable of holding 4,000 tons of salt. The Work which bids are asked includes, but is not necessarily limited to, cast-in-place concrete, reinforced concrete, metal fabrications, fiberglass door and frame, rolling service door, damp-proofing, painting, metal roofing, gutters and downspouts, electrical, earthwork, foundation excavations, finish grading, landscaping, site utilities, and others. To assure proper coordination and completion of each bid package under this Project, the Contractor shall collaborate with all trades and material suppliers. The Contractor shall generate a single submittal log, submittal file in the Project trailer, and single construction schedule.

C. The Project site is located at 734 W. Beloit Street, in Orfordville, WI 53576, (see location map on the Drawings). Test borings have been made by others and boring data is included in the Appendix of this Project Manual. Bidders should visit the Project site and acquaint themselves with all existing conditions. Bidders shall thoroughly photograph any extenuating conditions as a matter of record.

D. Temporary services shall comply with, but not limited to, the Special Conditions and Section 01 50 00. The Contractor shall coordinate temporary service connections with local utilities and all regulatory agencies.

E. The Owner reserves the right to contract separately other work not specifically stated in the Project Manual. The Owner, Rock County, will self-perform the rough grading of the site to remove bulk of cut material, installation of binder and finish course of all asphalt pavement, relocation and erection of the sand shed block walls and canopy, and relocation and erection of material bunker concrete block walls. The construction coordination shall adapt to the Owner's self-performed Work.

F. After final cleaning and upon written notice from the Contractor to the Architect that the Work is completed, the Architect will make a punch list of deficiencies and request their completion prior to final payment. Final payment will be made to the Contractor in accordance with the Conditions of the Contract. Upon completion of the Work, the Contractor shall remove from the Project site all material, tools and equipment belonging to him, and leave the Project site with an appearance acceptable to the Owner.

END OF SECTION

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SECTION 01 25 13
PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined by manufacturer's name and catalog number, reference to recognized industry and government standards, or description of required attributes and performance.
2. To ensure that the specified products or equivalent products are furnished and installed in accordance with design intent, procedures have been established for advance substitution request submittals for review by the Architect/Engineer.

B. Related Work Described Elsewhere:

1. Individual requirements for products are described in other pertinent Sections of these Specifications and the Supplementary Conditions of the Contract.

1.02 QUALITY ASSURANCE

A. Product Quality Equivalence:

1. Provide all information necessary as determined by the Architect/Engineer for adequate comparison of specified product to requested substitution.
2. All substitutions shall be of equivalent quality to the specified product as determined by the Architect/Engineer.

1.03 SUBMITTALS

A. Submit samples, manufacturer’s literature, colors, etc., of both original product specified and requested substitution.

B. For equipment submittals, provide physical data including dimensions, weights etc., and a drawing or diagram demonstrating that the proposed substitution fits in the space provided and that the designed supports are adequate. Differences between the specified product and the proposed substitution must be clearly identified for the Architect/Engineer’s review.

C. Where equipment substitutions include change in utility requirements such as a change in motor horsepower, the difference between the specified product and the proposed substitution must be clearly identified for the Architect/Engineer’s review.

D. Provide cost comparison between specified product and requested substitution in equivalent terms and quantities.

E. Substitution approval does not relieve the Contractor from submitting shop drawings for the product. Make all submittals of shop drawings, samples, and other items, in strict accordance with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

2.01 SUBSTITUTIONS

A. Substitution Requests:

1. **Prior to Submission of Bid**, all proposed substitutions shall be requested by the Bidder/Contractor no less than 5 business days in advance of the bid due date on Section 00 43 25 - Substitution Request Form. The Architect/Engineer shall review the request and determine whether or not the products are acceptable. The Architect/Engineer shall inform the Bidder/Contractor of the decision no less than 2 days prior to the bid due date. The decision of the Architect/Engineer shall be final.

B. Substitution List:

1. All proposed substitutions shall be provided by the Bidder/Contractor on Section 00 26 00 - Substitution List. The Owner shall review the list of substitutions and determine whether or not the products are acceptable. The decision of the Owner shall be final.

C. Unauthorized Substations:

1. Products and materials shall not be substituted with other products and materials during the construction phase. Substituted products and materials installed without prior review and approval by the Architect/Engineer or Owner shall be subject to rejection, removal and/or replacement by the Architect/Engineer or Owner at the expense of the Bidder/Contractor.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Substituted products shall be installed using the same quality workmanship and manner as the originally specified product, per the manufacturer's recommendations, and shall be acceptable to the Architect/Engineer.

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:
   1. Pre-construction conference.
   2. Pre-installation conferences.
   3. Progress meetings.

1.03 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction conference before starting construction, at a time convenient to the Owner and the Architect, but no later than 15 days after execution of the Agreement. Hold the conference at the Project site or another convenient location. The Architect will conduct the meeting. The Contractor will review and present Contractor's responsibilities and personnel assignments.

B. Attendees: Authorized representatives of the Owner, Architect, and their consultants; the Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: Discuss items of significance that could affect progress, including the following:
   1. Introductions:
      a. Owner
      b. Architect
      c. Contractor
   2. Status of Contracts
   3. Permits and licenses
   4. Insurance
   5. Contractor information
      a. Schedule
      b. List of sub-contracts
      c. Insurance forms
   6. Request for payment procedure
   7. Change Order process
   8. Correspondence
   9. Orders and directions
   10. Meetings
   11. Submittals
   12. Record Drawings
   13. Existing facilities
   14. Owner's day-to-day schedule
   15. General cleaning
   16. Parking

a. Labor parking
b. Trailer

1.04 PRE-INSTALLATION CONFERENCES

A. Conduct a pre-installation conference at the Project site before each construction activity that requires coordination with other construction.

B. Attendees: The Contractor, Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for the following: Contract Documents.

b. Options.
c. Related Change Orders.
d. Purchases.
e. Deliveries.
f. Shop drawings, product data, and quality-control samples.
g. Review of mockups.
h. Possible conflicts.
i. Compatibility problems.
j. Time schedules.
k. Weather limitations.
l. Manufacturer's recommendations.
m. Warranty requirements.
n. Compatibility of materials.
o. Acceptability of substrates.
p. Temporary facilities.
q. Space and access limitations.
r. Governing regulations.
s. Safety.
t. Inspecting and testing requirements.
u. Required performance results.
v. Recording requirements.
w. Protection.

2. Record significant discussions and agreements and disagreements of each conference, and the approved schedule.
3. Do not proceed with the installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.05 PROGRESS MEETINGS

A. Conduct progress meetings at the Project site at regular intervals. Notify the Owner and the Architect of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request. Attendees: In addition to representatives of the Owner and the Architect, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.

C. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.

a. Review the present and future needs of each entity present, including the following: Interface requirements.
b. Time.
c. Sequences.
d. Status of submittals.
e. Deliveries.
f. Off-site fabrication problems.
g. Access.
h. Site utilization.
i. Temporary facilities and services.
j. Hours of work.
k. Hazards and risks.
l. Housekeeping.
m. Quality and work standards.
n. Change Orders.
o. Documentation of information for payment requests.

D. Reporting: No later than 3 days after each meeting, distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.

E. Schedule Updating: Revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS

2.01 Not Used

PART 3 - EXECUTION

3.01 Not Used

END OF SECTION

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SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.01 GENERAL

A. Submittals: Submit the following:

1. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category (action or informational).
    d. Name of subcontractor.
    e. Description of the work covered.
    f. Scheduled date for Architect's final release or approval.

B. Contractor's Construction Schedule: Submit two printed copies of initial schedule large enough to show entire schedule for entire construction period.

C. Daily Construction Reports: Submit two copies at monthly intervals.

D. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

E. Coordination: Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, submittals schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from parties involved.
2. Coordinate each construction activity with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.01 SUBMITTALS SCHEDULE

A. Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, re-submittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

B. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

C. Submit within seven days after Award of Contract.

2.02 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Submit a comprehensive, fully developed, horizontal Gantt-chart-type Contractor's Construction Schedule within twenty-one days of date established for commencement of the Work.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

C. For construction activities that require 3 months or longer to complete, indicate an estimated completion percentage in ten percent increments within time bar.

D. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early or late completion date, unless specifically authorized by Change Order.

E. Activities: Treat separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than twenty days, unless specifically allowed by Architect.
   2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
   3. Tabulation:
      a. Furnish a tabulation of each activity. Show the following information as a minimum for each activity:
         i. Preceding and following event numbers.
         ii. Activity description.
         iii. Estimated duration of activities.
         iv. Earliest start date (by calendar date).
         v. Earliest finish date (by calendar date).
         vi. Latest start date (by calendar date).
         vii. Latest finish date (by calendar date).
         viii. Slack or float (in calendar days).
   4. Submittal Review Time: Include review and re-submittal times indicated in Division 1 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
   5. Startup and Testing Time: Include the number of days for startup and testing.
   6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
   7. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
      a. Phasing: Arrange list of activities on schedule by phase.
      b. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
      c. Work Restrictions: Show the effect on the schedule of limitations of continued occupancies, uninterruptible services, use of premises restrictions, and provisions for future construction.
      d. Work Stages: Indicate important stages of construction for each major portion of the Work.
      e. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, interim milestones, Substantial Completion, and Final Completion.
   8. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.

F. Daily Construction Reports: Prepare a daily construction report recording events at Project site, including list of subcontractors; high and low temperatures and general weather conditions; accidents; stoppages, delays, shortages, and losses; meter readings; orders and requests of authorities having jurisdiction; and equipment or system tests and start ups.

G. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare a detailed report. Submit a request for information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate actual completion percentage for each activity.
4. Distribution: Distribute copies of schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
    a. Post copies in Project meeting rooms and temporary field offices.
    b. When revisions are made, distribute updated schedules to the same parties and post in the same locations.

END OF SECTION

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SECTION 01 32 13
SCHEDULING OF CONSTRUCTION

PART 1 - GENERAL

1.01 SUMMARY

A. To assure adequate planning and execution of the Work so that the Work is completed within the number of calendar days allowed in the Contract, and to assist the Architect in appraising the reasonableness of the proposed schedule and in evaluating progress of the work, prepare a manpower loading chart.

B. Related Work:

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Requirements for Progress Schedule: Refer to General Conditions.
3. Construction Period: Refer to Form of Agreement.

C. Definitions:

1. "Day," as used throughout the Contract unless otherwise stated, means "calendar day."

1.02 SUBMITTALS

A. Comply with pertinent provisions of Section 01 33 00.

B. Preliminary Man-loading Chart: Prior to construction start, General Contractor shall submit a manloading chart by crafts for duration of Contract.

C. Man-loading Chart: Within 10 calendar days after receipt of Notice to Proceed, submit one reproducible copy of the manloading chart prepared in accordance with Article 3.1 below.

D. Revised Analysis: Within ten calendar days after receipt of the Architect's review comments, submit one reproducible copy of the network analysis revised in accordance with those comments.

E. Periodic Reports: On the first working day of each month, the General Contractor shall submit a 3-month manpower loading chart by craft and major work item to the Owner and Architect.

1.03 QUALITY ASSURANCE

A. Perform data preparation, analysis, charting, and updating in accordance with pertinent recommendations contained in current edition of "CPM In Construction" manual of the Associated General Contractors.

PART 2 - PRODUCTS

2.01 MANLOADING CHART

A. Diagram:

1. Graphically show the order and interdependence of all activities necessary to complete the Work, and the sequence in which each such activity is planned to be accomplished, as planned by each contractor and their project field superintendents in coordination with all subcontractors and materials suppliers whose work is shown on the diagram.
2. Include, but do not necessarily limit to, indicated activities for:
   a. Project mobilization;
   b. Submittal and approval of shop drawings;
   c. Procurement of equipment and critical materials;

d. Fabrication of special equipment and material, and its installation and testing;

e. Final cleanup;

f. Final inspecting and testing; and

g. All activities of the Owner and the Architect which affects progress and/or affect required dates for completion of all or part of the Work.

3. Show information in such detail that duration times of activities will range normally from one to 15 calendar days.

4. Show on the diagram, as a minimum for each activity, preceding and following event numbers, description of each activity, cost, and activity duration in calendar days.

B. Tabulation:

1. Furnish a tabulation of each activity. Show the following information as a minimum for each activity:

a. Preceding and following event numbers.

b. Activity description.

c. Estimated duration of activities.

d. Earliest start date (by calendar date).

e. Earliest finish date (by calendar date).

f. Latest start date (by calendar date).

g. Latest finish date (by calendar date).

h. Slack or float (in calendar days).

PART 3 - EXECUTION

3.01 MANLOADING CHART

A. Submit in accordance with Article 1.02 above.

3.02 REVISIONS TO APPROVED SCHEDULE

A. Method:

1. Following approval of the schedule, if the Contractor desires to make changes in his method of operating and scheduling, they shall so notify the Architect in writing their reasons.

2. If the Architect considers these changes to be of a major nature, he may require the Contractor to revise and submit for approval, without additional cost to the Owner, all of the affected portions of the detailed diagrams and summary diagram to show the impact on the entire Work.

B. Major Change:

1. A change may be considered of a major nature if the time estimated to be required or actually used for an activity, or the logic of sequence of activities, is varied from the original plan to a degree that the Architect has reasonable doubt as to completion of the Work within the Contract Time.

2. Changes which affect activities with adequate slack time shall be considered a major change when their cumulative effect may affect the Contract completion date.

3.03 PERIODIC REPORTS

A. Contents:

1. Report actual progress by updating the manloading chart.

2. Note on the summary chart, or clearly show on a revised chart issued of affected portions of the detailed chart, all revisions causing changes in the detailed chart.

3. Revise the summary chart as necessary for clarity.

4. Activities or portions of activities completed during the reporting period, and their total value as basis for Contractor's periodic request for payment. Payment made pursuant to the Agreement may, when the Architect so directs, be based on the total value of such activities completed or partially completed after verification.
5. State the percentage of the Work actually completed and scheduled as of the report date, and the progress along the critical path in terms of days ahead of or behind the allowable dates.
6. If the work is behind schedule, also report progress along other paths with negative slack.
7. Include written narrative report which shows, but is not necessarily limited to:
    a. A description of problem areas, anticipated and current;
    b. Delaying factors and their impact;
    c. An explanation of corrective actions taken or proposed.
8. Show the date of latest revision.

B. Submit in accordance with Article 1.02 above.

END OF SECTION

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SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.01 SUMMARY

A. Wherever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined by manufacturer's name and product catalog number, reference to recognized industry and government standards, or description of required attributes and performance. To ensure that the specified products are furnished and installed in accordance with design intent, procedures have been established for advanced submittal of design data and its review by the Architect/Engineer. Make all submittals in strict accordance with the procedures defined in this Section.

B. Related Sections

1. Individual requirements for submittals are described in the pertinent Sections of these Technical Specifications.
2. Division 0 Section 00 73 00 - Supplementary Conditions.
3. Division 1 Section 01 78 36 - Warranties
4. Division 1 Section 01 78 23 - Operation and Maintenance Data

1.02 SUBMITTAL REQUIREMENTS

A. Make all submittals required by the Contract Documents, revise, and re-submit as necessary to establish compliance with the specified requirements.

B. Each submittal shall contain the number of copies which are required to be returned, plus three copies which will be retained by the Architect/Engineer unless indicated otherwise in other portions of this Section.

1. Alternatively, a single electronic copy in Adobe Acrobat format can be submitted if allowed by the Architect/Engineer. Required samples and final component submittals cannot be submitted electronically. Only electronic copies will be returned (no paper copies).

C. Each submittal shall indicate project name and location, Architect/Engineer contact information, and Contractor contact information. Contact information shall include name, project number, address, telephone and facsimile numbers.

D. Additional Submittal Requests

1. The Architect/Engineer may request additional supporting data at any time to help determine compliance of submittals with the Contract Documents.

1.03 QUALITY ASSURANCE

A. Qualifications

1. Professional or Structural Engineer Qualifications:
   a. Legally authorized to practice in the jurisdiction where the project is located and who is experienced in providing engineering services to the kind indicated that have resulted in installations similar to those required on this project and with a record of successful in-service performance.

B. Review and Coordination of Submittals

1. Prior to each submittal, carefully review and coordinate all aspects of each item being submitted including, but not necessarily limited to:
   a. Determine and verify all interface conditions, catalog numbers, and similar data.
   b. Coordinate with other trades as required.
   c. Clearly indicate all deviations from requirements of the Contract Documents.

2. Verify the submittal contains all required information. Partial submittals will not be accepted.
3. Verify dimensions and completeness of each submittal. The Architect/Engineer review is limited as defined in the General Conditions of the Contract for Construction and does not include dimensions and items not included on the submittals.
4. All corrections to submittals shall be made directly on the submittal literature or drawings (not loose leaf documents) and shall be copied word for word to all copies.
5. Verify that each item and the submittal conforms in all respects with the requirements of the Contract Documents
6. Attach the Contractor's stamp of approval and signature to each submittal to certify that this coordination has been performed. Submittals transmitted to the Architect/Engineer without the Contractor's stamp will be returned without review, and shall be re-submitted when the Contractor's review has been completed and the stamp applied.

1.04 TIMING OF SUBMITTALS

A. General
1. Submittals shall be made far enough in advance of scheduled dates for installation to provide necessary time required for reviews, for securing necessary approvals, for possible revisions and re-submittals, and for placing orders and securing delivery.
2. The Contractor shall make the required submittals within the time required to meet the construction schedule or shall present, in writing, valid reasons for any delay. It shall be the contractor's responsibility to ensure that delivery of the submittals to the Architect/Engineer has been completed.
3. Obtain acceptance of all submittals prior to fabrication.

PART 2 - PRODUCTS

2.01 SUBMITTAL SCHEDULE

A. General
1. Compile a complete and comprehensive schedule of all submittals anticipated to be made during progress of the Work. Include a list of each item for which shop drawings, product data, samples, certificates of compliance, warranties, or other types of submittals are required. The Contractor shall adhere to the schedule except when specifically otherwise permitted in writing by the Architect/Engineer. The Contractor's failure to submit the aforementioned schedule will be grounds for withholding certification of payment.

B. Coordination
1. Coordinate the schedule with all necessary subcontractors and material suppliers to ensure their understanding of the importance of adhering to the approved schedule and their ability to so adhere. Coordinate as required to ensure the grouping of submittals as described below.

2.02 SHOP DRAWINGS

A. Sufficient data in each set of shop drawings shall be included to permit a detailed study of the system submitted.

B. Scale and Measurements: Make all shop drawings accurately to a scale sufficiently large to show all pertinent aspects of the item and its method of connection to the Work.

C. Maximum sheet size for shop drawings shall be 24" by 36".

D. Shop drawings shall be specially drawn for this Project, including detailed erection and production drawings, setting drawings, diagrammatic drawings, material schedules, and samples. Copying the Architect/Engineer drawings is not permitted.

E. Shop drawings for all equipment in a given system shall be submitted at one time, with each

complete set in a separate brochure.

F. Each sheet of shop drawings shall identify the Project name and location; the Architect/Engineer's name, Architect/Engineer's Project number, and contact information including address, telephone, and facsimile numbers; and the Contractor's name, Contractor's project number, and contact information including address, telephone, and facsimile numbers. In addition to the Contractor, the subcontractor/fabricator/manufacturer name, project number, and contact information shall be indicated.

G. All shop drawings shall be numbered in consecutive sequence, and each sheet shall indicate the total number of sheets in the set. Each set shall be bound.

H. Each sheet shall indicate the date issued and any revisions. If the submittal is permitted to be phased or revisions are made, the provisions for phased submittals below shall be followed.

I. The shop drawings shall indicate types, shapes and sizes, and finishes of all materials. Where a shop coat of paint/primer is required, its brand name and manufacturer's identification number of type shall be indicated.

J. Erection Drawings - Detail product installation including:

1. Each member's designation (identification or piece mark), shape and size shall be clearly indicated and completely dimensioned.
2. Plans and elevations shall locate each member by designation, define all work provided, and indicate sequence of erection for stability, handling requirements, or for other special conditions.
3. Sections and details shall show member connections and relationship of members to adjacent materials, to the structure, and other construction.
4. Indicate all loading used in the design

K. Production Drawings - Detail product fabrication including:

1. Each member's designation (identification or piece mark), shape and size shall be clearly indicated and completely dimensioned.
2. Indicate methods for storage and transportation.

2.03 PRODUCT DATA

A. General

1. Submit manufacturer's literature, brochures, technical data, MSDS, etc., to permit a detailed study of the product submitted.
2. Where contents of submitted literature from manufacturers include data not pertinent to the submittal, clearly indicate which portion of the contents is being submitted for review.

2.04 SAMPLES

A. Samples shall be of the precise article proposed to be furnished.

B. Submit two samples, unless otherwise requested.

C. Colors and Patterns: Unless the precise color and pattern is specifically described in the Contract Documents, and whenever a choice of color or pattern is available in a specified product, submit two copies of accurate color and pattern charts to the Architect/Engineer for review and selection.

2.05 CERTIFICATES OF COMPLIANCE

A. Certify that all materials used in the Work comply with all specified provisions thereof. Certification shall not be construed as relieving the Contractor from furnishing satisfactory materials if, after tests are performed on selected samples, the material is found not to meet specified requirements.

B. Show on each certificate the name and location of the Project, name and address of Contractor, quantity and date or dates of shipment or delivery to which the certificate applies, and name of the manufacturing or fabricating company. Certification shall be in the form of a letter or company-standard forms containing all required data. Certificates shall be signed by an officer of the manufacturing or fabricating company.

C. In addition to the above information, all laboratory test reports submitted with Certificates of Compliance shall show the date or dates of testing, the specified requirements for which testing was performed, and results of the test or tests.

D. Upon completion of the Work, and as a condition of its acceptance, submit to the Architect/Engineer all Certificates of Compliance.

2.06 WARRANTIES

A. All warranties shall be compiled and submitted.

B. Submit three (3) copies.

2.07 OPERATION AND MAINTAINANCE DATA

A. All operational items of equipment require the manufacturer's operation and maintenance data information and parts lists. The information contained therein shall be in agreement with approved shop drawings, wiring diagrams, etc.

PART 3 - EXECUTION

3.01 IDENTIFICATION OF SUBMITTALS

A. General:

1. Consecutively number all submittals. Accompany each submittal with a Letter of Transmittal containing all pertinent information required for identification and checking of submittals.
2. Include on the Letter of Transmittal the Technical Specification Section number under which the submittal is made.

B. Internal Identification:

1. On at least the first page of each copy of each submittal, and elsewhere as required for positive identification, clearly indicate the submittal number in which the item was included.

C. Re-submittals

1. When material is re-submitted for any reason, transmit under a new Letter of Transmittal and with a new submittal number.

D. Submittal Log:

1. Maintain an accurate submittal log for the duration of the Contract, showing current status of all submittals at all times. Make the submittal log available for the Architect/ Engineer's review upon request.

3.02 COORDINATION OF SUBMITTALS

A. Grouping of Submittals:

1. Unless otherwise specified, make all submittals in groups containing all associated items to ensure that information is available for checking each item when it is received. Partial submittals may be rejected as not complying with the provisions of the Contract Documents and the Contractor shall be strictly liable for all delays so occasioned.

B. Phasing of Submittals:

1. Phasing of submittals shall not be permitted unless written permission has been given by the Architect/Engineer.

2. Phased submittals when permitted shall follow the sequence below:
    a. First submittal
    b. All subsequent submittals
        i. Newly detailed items shall be easily identified with clouds around the new items (when placed on sheets that were included in the first submittal) or shall be submitted on new drawing sheets.
        ii. When changed items are not identified on the submittal, the items will not be reviewed for conformance and the Architect/Engineer notations will not apply to the changes. Refer to the General Conditions of the Contract for Construction for changed items other than those requested by the Architect/Engineer.

C. Transmit required submittals to the Architect/Engineer for review. After review, the Architect/Engineer will return the number of submittals required to be returned marked with notations as follows:
    1. The notations "Processed" or "Processed with Notations" authorize the Contractor to proceed with the purchase and/or fabrication of the items so noted, subject to the revisions, if any, required by the Architect/Engineer's review comments. Upon receipt, the Contractor shall have sufficient sets of prints made for distribution to appropriate subcontractors, fabricators, manufacturers, and suppliers who require them for coordination of their work.
    2. The notation "Re-submit" requires the submittal to be corrected and re-submitted. The Contractor shall not proceed with purchase and/or fabrication of items marked “Re-submit”.
    3. Corrected and re-submitted items shall not be purchased and/or fabricated until the Architect/Engineer has marked the submittals "Processed" or "Processed with Notations".

D. Revisions after Approval:
    1. When a submittal has been reviewed by the Architect/Engineer, re-submittal for substitution of materials or equipment will not be considered unless accompanied by an acceptable explanation as to why the substitution is necessary. All decisions by the Owner and Architect are final.

END OF SECTION

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SECTION 01 42 00
REFERENCE STANDARDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Throughout the Contract Documents, reference is made to codes and standards which establish qualities and type of workmanship and materials, and which establish methods for testing and reporting on the pertinent characteristics.
2. Where materials or workmanship are required by these Contract Documents to meet or exceed the specifically named code or standard, it is the Contractor's responsibility to provide materials and workmanship, which meet or exceed the specifically named code or standard.
3. It is also each Contractor's responsibility, when so required by the Contract Documents or by written request from the Owner, to deliver to the Owner all required proof that the materials or workmanship, or both, meet or exceed the requirements of the specifically named code or standard. Such proof shall be in the form requested in writing by the Owner, and generally will be required to be copies of a certified report of tests conducted by a testing agency approved for that purpose by the Owner.

B. Related Work Described Elsewhere:

1. Specific naming of codes or standards occurs on the Drawings and in other Sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Familiarity with Pertinent Codes and Standards:

1. In procuring all items used in this Work, it is each Contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify that the items procured for use in this work meet or exceed the specified requirements.

B. Rejection of Non-Complying Items:

1. The Owner reserves the right to reject items incorporated into the Work which fail to meet the specified minimum requirements.
2. The Owner further reserves the right, and without prejudice to other recourse the Owner may take, to accept non-complying items subject to an adjustment in the Contract Amount as approved by the Owner.

C. Applicable standards listed in these Specifications include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

1. AAMA: American Architectural Manufacturers Association, Schaumburg, IL 60173-4268, (847) 303-5664; www.aamanet.org.
2. AASHTO: American Association of State Highway and Transportation Officials, Washington, DC 20001, (202) 624-5800; www.aashto.org.
3. ACI: American Concrete Institute International, Farmington Hills, MI 48333, (248) 848-3700; www.aci-int.org.
4. ADA(G): Americans with Disabilities Act, and Accessibility Guidelines.
5. AISC: American Institute of Steel Construction, Inc., Chicago, IL 60601-2001, (312) 670-2400; www.aisc.org.
6. ANSI: American National Standards Institute (successor to USASI and ASA0), New York, NY 10036, (212) 642-4900; www.ansi.org.
7. ASTM: American Society for Testing and Materials/ ASTM International, West Conshohocken, PA 19428-2959, (610) 832-9585; www.astm.org.

8. AWS: American Welding Society, Inc., Miami, FL 33126, (305) 443-9353; www.aws.org.
9. AWWA: American Water Works Association, Inc., Denver, CO 80235, (303) 794-7711; www.awwa.org.
10. BOCA: Buildings Officials & Code Administrators International, Inc., (now International Code Council.)
11. CRSI: Concrete Reinforcing Steel Institute, Schaumburg, IL 60173-4758, (847) 517-1200; www.crsi.org.
12. CS: Commercial Standard of National Bureau of Standards, U.S. Department of Commerce, Government Printing Office, Washington, DC 20402.
13. WisDOC: Department of Commerce, 201 W. Washington Ave., Madison, WI 53702, (608) 226-1018.
14. WisDNR: Department of Natural Resources, P.O. Box 7921, Madison, WI 53707-7921, (608) 266-2621.
15. FGMA: Flat Glass Marketing Association, (now Glass Association of North America,) Topeka, KS 66614-5321, (785) 271-0208; www.glasswebsite.com.
16. GA: Gypsum Association, Washington, DC 20002, (202) 289-5440; www.gypsum.org.
17. ICC: International Code Council, Falls Church, VA 22041, (703) 931-4533; www.iccsafe.org.
18. KCMA: Kitchen Cabinet Manufacturers Association, Reston, VA 20191-5435, (703) 264-1690; www.kcma.org.
19. NAAMM: The National Association of Architectural Metal Manufacturers, Chicago, IL 60603, (312) 332-0405; www.naamm.org.
20. NEC: National Electrical Code (see NFPA).
21. NEMA: National Electrical Manufacturers Association, Rosslyn, VA 22209, (703) 841-3200; www.nema.org.
22. NFPA: National Fire Protection Association, Quincy, MA 02169-7471, (617) 770-3000; www.nfpa.org.
23. SDI: Steel Deck Institute, Fox River Grove, IL 60021-0025, (847) 458-4647; www.sdi.org.
24. SJI: Steel Joist Institute, Myrtle Beach, SC 29577-6760, (843) 626-1995; www.steeljoist.org.
25. SSPC: Society for Protective Coatings, Pittsburgh, PA 15222-4656, (412) 281-2331; www.sspc.org..
26. TCA: Tile Council of America, Inc., Anderson, SC 29625, (864) 646-8453; www.tileusa.com.
27. UL: Underwriters Laboratories, Inc., Northbrook, IL 60062-2096, (847) 272-8800; www.ul.com.
28. UBC: Uniform Building Code, International Conference of Building Officials, (now International Code Council).
29. WCSBMPH: Wisconsin Construction Site Best Management Practice Handbook, Wisconsin Department of Natural Resources, P.O. Box 7921, Madison, WI 53707-7921
30. Federal Specifications and Federal Standards: Specifications Sales (3FRI), Building 197, Washington Navy Yard, General Services Administration, Washington, DC 20407.

END OF SECTION

SECTION 01 45 00
QUALITY CONTROL

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Work under this section includes all labor, materials, equipment, facilities, and services necessary to complete the quality control work as shown on the drawings and herein specified.

B. Related Sections

1. Individual requirements for quality control are defined in other pertinent sections of these Specifications.

C. Payment Procedures

1. Contractor shall provide quality control services specified.
2. Contractor shall provide quality control services required by authorities having jurisdiction whether specified or not.
3. Contractor shall pay for tests and inspections performed by the testing agency unless the Owner has indicated otherwise.
4. Obtain costs for all specified testing and inspections performed by the testing agency and include costs as a line item in Division 01 – Section 00 41 16 Material or Subcontractor Bid Form. Tests and Inspections not specified and estimated costs for re-testing and re-inspection shall not be included in the line item.
5. Testing and inspecting requested by the Contractor and not required by the Contract Documents are the Contractor's responsibility.
6. Contractor shall bear all costs of removal and replacement of material for items that do not remain accessible and exposed for testing and inspections.
7. Contractor shall bear all costs made necessary by non-compliance with the Contract Documents or provisions of governing rules and regulations, i.e., codes, laws, ordinances, etc., including those of repeated procedures and compensation for Design Professional's services and expenses.
8. Even if the Owner pays for original testing and inspections performed by the testing agency, the Contractor shall bear the costs for the following:
    a. Re-testing due to failure of initial test or due to non-compliance with Contract Documents.
    b. Re-inspection of Work due to failure of Work to pass initial inspection or due to non-compliance with Contract Documents.

1.02 DEFINITIONS

A. Quality Assurance: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and to substantiate that proposed construction will comply with requirements.

B. Quality Control: Tests, inspections, procedures, and related activities and actions performed during or after execution of the Work to evaluate that actual products incorporated into the Work and completed construction complies with requirements.

C. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

D. Source Quality Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

E. Field Quality Control Testing: Tests and inspections that are performed on-site for installation of the work and for completed Work.

1.03 SYSTEM DESCRIPTION

A. Testing and inspecting services are required to verify compliance with specified requirements and governing rules and regulations, i.e., codes, laws, ordinances, etc. These services do not relieve the Contractor of responsibility for compliance with the Contract Documents.

B. Portions of the Work which do not comply with requirements established by the Contract Documents or provisions of governing rules and regulations, i.e., codes, laws, ordinances, etc., shall be made to comply.

C. Required Testing and Inspections:

1. Individual requirements for testing and inspection are defined in other pertinent sections of these Specifications.
2. Local, state, and federal jurisdiction inspections vary. Confirm the required inspections with the individual authorities.
3. The following testing and inspections shall be performed by a testing agency:
    a. Site excavation inspection, rough grading inspection, and bearing capacity testing: Section 31 00 00 Earthwork.
    b. Soil compaction testing and inspection and pavement base course testing and inspection: Section 31 00 00 Earthwork, 32 11 23 Aggregate Base Course, and Section 32 12 16 Bituminous Concrete Paving.
    c. Concrete reinforcing inspection: Section 03 20 00 Concrete Reinforcement.
    d. Concrete testing: Section 03 30 00 Cast-in-Place Concrete.
    e. Masonry construction testing and inspection: Section 04 21 00 Clay Masonry Units and Section 04 22 00 Concrete Masonry Units.
    f. Structural steel welding, bolts, and stud testing and inspection (except testing to qualify welders): Section 05 12 00.
    g. Metal roof deck inspection: Section 05 31 00.
    h. Underground piping inspection and Water supply testing: Section 33 00 00 Utility Services, Section 33 21 00 Water Supply, Section 33 21 00 Water Supply Wells, and Section 33 36 00 Septic Tank Systems.
    i. Others, if required by the individual sections of these Specifications.
4. Re-testing/Re-inspecting is required for construction that replaced work that failed to comply with the Contract Documents or the provisions of governing rules and regulations, i.e., codes, laws, ordinances, etc.

D. Specified testing and inspecting does not limit the Contractor's other quality assurance and quality control procedures that facilitate compliance with the Contract Documents.

E. Work shall be subject to testing and inspection by the Owner, Design Professional, testing agency, inspectors, and public authorities having jurisdiction.

F. Approval as a result of testing or inspection shall not be construed to be an approval of a violation of provisions of the Contract Documents or provisions of governing rules and regulations, i.e., codes, laws, ordinances, etc.

G. Testing, inspections, or approvals presuming to give authority to violate or cancel the provisions of the Contract Documents or provisions of governing rules and regulations, i.e., codes, laws, ordinances, etc., shall not be valid.

1.04 SUBMITTALS

A. Submittals shall be in accordance with Division 01 – Section 01 33 00 Submittal Procedures.

B. Quality Assurance/Control Submittals

1. Certificate from qualified accreditation authority showing Testing and Inspection Agency's compliance with ASTM Standard E329 for each testing agency used.

2. Certificate issued by each Testing and Inspection Agency used that states the agency is independent and is not associated with the Contractor performing the work by any means and will remain independent and not associated with the Contractor for the duration of the project. It shall also state that all results and recommendations provided by the agency will be unbiased and impartial toward any party involved for the duration of the project.

C. Schedule of Testing and Inspecting

1. Prepare a Master Schedule of all items to be tested and inspected. By coordination with the construction schedule, establish tentative dates for each such activity.
2. Submit for the Design Professional's review. Make any agreed upon revisions and resubmit.

D. Prepare the schedule including items specified in Division 01 – Section 01 33 00 Submittal Procedures. Also include the following in tabular form:

a. Specification section number and title
b. Description of test and/or inspection required
c. Identification of applicable standard
d. Identification of test and/or inspection method required
e. Number of tests and/or inspections required
f. Time schedule and time span for tests and/or inspections
g. Entity responsible for performing tests and/or inspections
h. Requirements for obtaining samples
i. Unique characteristics/requirements for tests and/or inspections

2. Include in the schedule anticipated tests and/or inspections by manufacturer’s representatives and any authorities having jurisdiction.
3. Resubmit schedule when revisions are proposed.

E. Reports

1. Prepare all reports including items specified in Division 01 – Section 01 33 00 Submittal Procedures. Submit certified reports that include the following:

a. Date of issue.
b. Project name and location.
c. Testing and Inspecting Agency contact information including name, project number, address, telephone and facsimile numbers.
d. Dates and locations of tests and/or inspections.
e. Names of individuals making tests and/or inspections.
f. Record of field conditions (temperature & weather) at time of test/inspection.
g. Product identification and applicable specification section.
h. Type and description of test/inspection method.
i. Complete test/inspection data.
j. Test and inspection results and interpretation of results.
k. Comments/professional opinions on compliance with the Contract Documents.
l. Recommendations on re-testing/re-inspection.
m. Signatures of individuals making tests and/or inspections.

2. Report test results as called for and in the form specified by the test method.

F. Jurisdictional Compliance Paperwork: For Owner’s records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents established for compliance with standards and regulations bearing on performance of the Work.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Minimum qualification levels are established in individual specification sections in addition to the minimum qualifications specified herein.

2. Testing and Inspecting Agency Qualifications:

   a. Testing and Inspecting Agency qualified according to ASTM Standard E329 and with additional qualifications specified in other pertinent individual Specification sections.

   b. Testing and Inspecting Agency shall be accredited through an accreditation authority to meet ASTM Standard E329.

      i. Accreditation authority shall be acceptable to the Owner, Design Professional, and authorities having jurisdiction.

      ii. Pre-approved accreditation authorities acceptable to the Design Professional include:

         (a.) American Association for Laboratory Accreditation (A2LA)

         (b.) International Accreditation Service (IAS)

         (c.) National Voluntary Laboratory Accreditation Program (NVLAP)

         (d.) AASHTO Accreditation Program (AAP)

      iii. Pre-approval by the Design Professional does not automatically mean the Testing and Inspecting Agency is acceptable to the Owner or authorities having jurisdiction. The Contractor shall verify acceptability.

   c. Testing and Inspection Agency shall be independent and shall not be associated with the Contractor performing the work by any means. Agency shall also be able to provide unbiased and impartial results and recommendations to all parties involved in the project.

   d. Testing and Inspecting Agency shall be acceptable to the Owner, Design Professional, and authorities having jurisdiction.

      i. Pre-approved Testing and Inspecting Agencies acceptable to the Design Professional include:

         (a.) CGC, Inc.
         2921 Perry Street
         Madison, WI 53713
         Phone: (608) 288-4100
         Fax: (608) 288-7887

         (b.) ECS Illinois, LLC
         1575 Barclay Blvd.
         Buffalo Grove, IL 60089
         Phone: (847) 279-0366
         Fax: (847) 279-0369

         (c.) Professional Service Industries, Inc. (PSI)
         W237 N2878 Woodgate Road – Suite 2
         Pewaukee, WI 53072
         Phone: (262) 347-0898
         Fax: (262) 347-2256

(d.) Gestra Engineering Inc.
Offices in Madison, Milwaukee, and Kenosha
1626 W. Fond Du Lac Ave.
Milwaukee, WI 53205
Phone: (414) 933-7444 ext. 11
Fax: (414) 933-7844

(e.) Soils & Engineering Services, Inc.
1102 Stewart Street
Madison, WI 53713-4648
Phone: (608) 274-7600
Fax: (608) 274-7511

(f.) Terracon Consultants, Inc.
4836 Colt Road
Rockford, IL 61109
Phone: (815) 873-0990
Fax: (815) 873-0991

ii. Pre-approval by the Design Professional does not automatically mean the Testing and Inspecting Agency is acceptable to the Owner or authorities having jurisdiction. The Contractor shall verify acceptability.

B. Regulatory Requirements

1. Conform to requirements of local, state, and federal rules and regulations applicable to work and project location.
2. Conform to the applicable requirements and recommendations of the following codes, specifications, and standards except as modified by the Contract Documents and herein:
   a. ASTM Standard E329, 2009, “Standard Specification for Agencies Engaged in Construction Inspection and/or Testing”; ASTM International, West Conshohocken, PA, 2009, DOI: 10.1520/E0329-09, www.astm.org.
3. Where provisions of pertinent regulations, codes, and standards conflict with each other or this specification, the more stringent provisions shall govern. Refer uncertainties and requirements that are different, but apparently equal, to the Design Professional for a decision before proceeding.

PART 2 - PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Minimum levels of source quality control are established in individual specification sections.

PART 3 - EXECUTION

3.01 ADMINISTRATION

A. Testing and Inspecting Schedule

1. Maintain the schedule for testing and inspecting to accurately reflect progress of the Work.
2. Resubmit the testing and inspecting schedule to the Design Professional for review when revisions are proposed. Transmit in adequate time to permit proper rescheduling of activities in connection with inspection and tests.
3. Do not decrease the testing and inspecting activity without written permission from the Design Professional.

B. Test and Inspection Log

1. Prepare a record of tests and inspections that includes the following:
    a. Date test/inspection was conducted.
    b. Description of the Work tested or inspected.
    c. Date test or inspection results were transmitted to the Design Professional.
    d. Name of testing agency or special inspector conducting test or inspection.
    e. Test result – either compliant or noncompliant
    f. Date of re-test/re-inspection.
2. Maintain log at the Project site and provide access to the log for Owner's and Design Professional's reference. Post changes and modifications as they occur.

C. Reports

1. Promptly secure, process, and distribute copies of test and inspection reports and related instructions to ensure necessary retesting, replacement of materials, or both, as required, and with the least possible delay in progress of the Work.
2. Transmit copies of reports created by the testing agency to any public authorities having jurisdiction when they so direct.
3. Transmit copies of reports created by entities other than the testing agency to any public authorities having jurisdiction when they so direct and to the Design Professional.
4. Promptly secure, process, and distribute copies of certificates of testing, inspection or approval to any public authorities having jurisdiction when they so direct and to the Design Professional.

3.02 PROTECTION AND REPAIR/RESTORATION

A. Protect construction exposed by or for quality control services.

B. Upon completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other specification sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
2. Comply with Division 01 – Section 01 73 29 Cutting and Patching as applicable.

C. Protection and Repair are the Contractor's responsibility, regardless of whether the Owner directly employs any testing and inspection services.

3.03 FIELD QUALITY CONTROL

A. Coordination

1. Coordinate sequence of activities to accommodate required quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting. Contractor shall cause the Work to remain accessible and exposed for testing and inspection purposes.
2. Contractor shall make arrangements for all quality control to be completed including the tests and inspections to be performed by testing agencies, inspectors, and public authorities having jurisdiction.
3. For testing and inspecting specified to be performed by a testing agency, contractor personnel are not allowed to perform these services without direct supervision from testing agency personnel.
4. Provide preliminary information about materials requiring testing and inspection to the testing agency or other entities requiring it.

B. Notification

1. Notify appropriate testing agency, inspector, or public authorities having jurisdiction sufficiently in advance of operations that require tests and/or inspections or when the Work is ready for testing and/or inspection. If sufficient notice is not given, reschedule the operations so the appropriate testing and inspections can be completed. Contract time will not be extended to accommodate inadequate notice.
2. To permit the Design Professional to witness tests and/or inspections when desired, notify the Design Professional not less than 24 hours in advance.

C. Associated Services: Cooperate with testing agency personnel, inspectors, and public authorities having jurisdiction. Provide reasonable auxiliary services as requested along with the following:

1. Access to and means for testing and inspections of Work and manufacturer's operations promptly upon request.
2. Incidental labor and facilities needed to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting.
4. Storage and field curing facilities.
5. Provide transportation of test materials if necessary.
6. Security and protection for samples and testing and inspecting equipment at Project site.

D. Perform indicated testing and inspections at the appropriate time using methods specified and documented in the schedule of testing and inspections. Provide labor to aid in the testing and inspecting services if necessary.

E. Provide testing laboratory facilities required to perform the off-site testing.

F. Report each test and inspection result as indicated.

G. Portions of the Work which do not comply with requirements established by the Contract Documents or provisions of governing rules and regulations, i.e., codes, laws, ordinances, etc., shall be made to comply and such portions shall not be covered or concealed until authorized by testing agency, inspector, and public authorities having jurisdiction.

H. Re-test and re-inspect portions of the Work which did not comply with requirements established by the Contract Documents or provisions of governing rules and regulations, i.e., codes, laws, ordinances, etc. Report results as indicated.

I. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results as indicated.

3.04 TESTING AGENCY RESPONSIBILITIES AND LIMITATIONS OF AUTHORITY

A. Cooperate with Design Professional and Contractor in performance of duties.

B. Provide qualified personnel to perform required tests and inspections in a reasonable time frame upon notice.

C. Promptly notify Design Professional and Contractor of irregularities, or deficiencies of Work which are observed during performance of services.

D. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

E. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from specified requirements.

F. Submit a certified written report of each test, inspection, and similar quality control service to the Design Professional and Contractor. Reports shall be submitted in a prompt manner and

shall be submitted within 7 days after the test, inspection, or similar quality control service was performed.

G. Testing agency is not authorized to:
   1. Release, revoke, alter, or increase any requirements of the Contract Documents.
   2. Approve or accept any portion of the Work.
   3. Perform any duties of Contractor.

END OF SECTION

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Temporary facilities and controls required for this Work include, but are not necessarily limited to:
   a. Temporary utilities such as water, electricity and heat
   b. Temporary haul roads
   c. Toilets
   d. Field offices and sheds
   e. Temporary stairs and scaffolding
   f. Temporary signs
   g. Fire protection
   h. Watchmen
   i. Storage of materials
   j. Glass replacement
   k. Cleaning up
   l. Enclosures
2. Related Work Described Elsewhere:
   a. Except that all equipment furnished by Contractors shall comply with all requirements of pertinent safety regulations, the ladders, planks, hoists, and similar items normally furnished by the individual trades in execution of their own portions of the work are not part of this Section.
   b. Permanent installation and hook-up of the various utility lines are described in other pertinent Sections.

1.02 PRODUCT HANDLING

A. Use all means necessary to maintain temporary facilities and controls in proper and safe conditions throughout progress of the Work.

1.03 JOB CONDITIONS

A. Make all required temporary connections to existing utility systems with minimum disruption to services in the existing utility systems. When disruption of the existing service is required, do not proceed without the Architect/Engineer's approval and Owner’s consent and, when required, provide alternate temporary service.

PART 2 - PRODUCTS

2.01 UTILITIES

A. General:

1. All temporary facilities shall be subject to the Architect/Engineer's approval.

B. Temporary Water:

1. The Plumbing Trade shall furnish and install all necessary temporary water lines and water sources and, upon completion of the Work, remove all such temporary facilities as specified herein and in accordance with the Supplementary Conditions. The temporary sources shall be installed within 5’- 0" of the building at a minimum of two locations.
2. Each trade requiring water shall provide their own hoses from source to point of use.

3. The Owner shall pay for all water consumed throughout the duration of construction.

C. Temporary Lights and Power:

1. The Electrical Trade shall provide temporary service for power and lighting required in construction for all trades until construction has been completed, and approved service connections from the service board. The Electrical Trade shall provide the following facilities:
   a. Approved service connections from the service board. Confirm size of temporary service required and meter and install them accordingly. Provide temporary service from existing electrical service off-site. The new temporary service shall be located overhead on wooden power poles or direct buried into the ground and positioned to avoid conflict with construction equipment and personnel. Electrical Trade shall provide temporary service connection to a rain-tight service head 16'- 0" above grade.
   b. Provide 120 volt lighting and small power tool outlets throughout the Project site.
   c. Provide general lighting consisting of 150 watt (minimum) lamps and weatherproof sockets, and provide power outlets consisting of 120 volt pendant type cord connectors, and with ground fault circuit interrupters, for fractional horsepower electrical tools.
   d. 120 volt outlets shall be located such that no point in the Project site would make portable cord lengths excessive.
2. Each trade shall provide and maintain their own extension cords.
3. Use of in-place building switches or circuit breakers shall not be permitted. All construction power tools shall be fed from temporary power source with ground fault interrupter protection only.
4. Complete installation shall be in compliance with all applicable codes. The Electrical Contractor shall remove and salvage the temporary service when it is no longer required.
5. Trades requiring temporary three-phase power service shall make arrangements with the Electrical Trade through the General Contractor.
6. The Owner shall pay for all electricity consumed throughout the duration of construction.

D. Temporary Heat and Cold Weather Protection

1. Cold Weather Protection:
   a. All heating or covering, or both, required to protect the Project site from damage due to freezing during construction period prior to enclosure of building shall be provided by the General Contractor.
   b. Cold weather protection shall be provided by General Contractor.
2. Temporary Heating:
   a. When required, until time of substantial completion.
   b. In all areas and spaces that are roofed and have all exterior openings suitably enclosed.
3. General Contractor:
   a. Provide temporary window and door closures as required and closures for all other temporary openings. Supervise effectiveness of all closures and see that every reasonable precaution is used to prevent escape of heat.
   b. Permanent heating system may be used for temporary heating once the permanent heating system, heating controls, concrete installation, concrete curing, concrete saw-cutting, and masonry saw-cutting have been completed.
   c. If the permanent system is not operable and the building is enclosed and heating is required, then the General Contractor shall furnish and install a

temporary heating system.

d. All portable heating units shall be properly ventilated to prevent combustion gases from remaining in the heated area.

e. The General Contractor shall ascertain if temporary heating equipment will operate on the temporary electrical service available. If service is insufficient to operate equipment, the General Contractor shall make all other arrangements at no additional cost to the Owner.

f. The temporary heating system shall be removed by the General Contractor after the permanent heating system has been installed, is operating, and balanced. Temporary heating equipment shall be relocated by the General Contractor as required during construction to prevent interference with new construction.

g. Temperatures: Except as otherwise specified, a minimum temperature of 45 degrees F for the building shall be maintained until completion of the Project.

h. Operation: Supervise and be responsible for operation of temporary heating system as required by weather and building conditions through the duration of construction. Be responsible for maintenance of temporary heating systems during period of construction and do any emergency repair work required during temporary operation.

4. The Contractor shall pay for all fuel consumed and temporary heating equipment cost throughout the duration of construction until Substantial Completion at no additional cost to the Owner.

2.02 HAUL ROAD

A. The General Contractor shall build and remove a temporary haul road and lots for delivery of materials throughout the Project site at the Contractor's own expense and maintain it until completion of construction. All road materials shall be removed upon termination of access need, and the confines of the temporary roadway shall be repaired to match adjacent area. The Contractor shall maintain and repair temporary haul roads and lots as required to assure proper egress and ingress of construction equipment and vehicles. The temporary haul road shall be designed, by the Contractor, to prevent tracking of site materials on all public and private roads and lots. The use of specified aggregate base courses of paved roads and lots as temporary haul roads is not permitted.

2.03 TOILETS

A. The General Contractor shall provide and maintain temporary sanitary toilets, located where directed, in sufficient number required for the force employed. The toilets shall comply with the requirements of the Wisconsin Department of Commerce, General Orders on Sanitation. Toilets shall be self-contained chemical type.

B. The General Contractor shall maintain the temporary toilets in a sanitary condition at all times and shall supply toilet paper and hand sanitizer dispenser until completion of the Project.

2.04 FIELD OFFICES & SHEDS

A. The General Contractor shall provide and maintain a temporary watertight office where directed for use by the Contractor, Architect, and Owner. The office shall be equipped with a telephone, telephone answering machine, fax machine, plan racks, suitable tables for examination of plans, power, light, heat, and air conditioning.

B. If other offices are provided by other Contractors, they will be located as agreed to by the Contractor, the Architect/Engineer, and Owner.

C. Sheds for storage of materials that may be damaged by weather shall be provided and maintained by each Contractor. Sheds shall have raised wood floors.

D. All temporary facilities including furniture will remain the property of the Contractor and shall

be removed from the site after completion of the Work.

2.05 STAIRS & SCAFFOLDS

A. The Contractor shall:

1. Furnish and maintain equipment such as temporary stairs, fixed ladders, ramps, chutes, runways and the like as required for proper execution of work by all trades.

B. Underlay interior scaffolds with planking to prevent uprights from resting directly on the floor construction.

2.06 SIGNS

A. No individual advertising signs, plaques or credits, temporary or permanent, will be permitted on the building or premises, except the Contractor's name on his office or material shed.

B. General Contractor shall handle ordering and erection of a Project sign, traffic control signs for the temporary haul road in accordance with local regulations, construction parking signs, and temporary posts for the signs.

C. Sign contractor shall obtain all necessary county and state sign permits.

2.07 FIRE PROTECTION

A. The General Contractor shall provide and maintain in working order during the entire construction period with in the construction area, trailers & storage sheds. Fire extinguishers to be the size, number and type as required by local fire Marshalls.

B. The fire extinguishers and cabinets specified under Technical Specification Section 10 44 00 shall not be used for this purpose.

2.08 WATCHMEN

A. Watchmen will not be furnished by Owner. The Contractor shall provide such precautionary measures, to include the furnishing of watchmen if deemed necessary, to protect persons and property from damage or loss where the Contractor's work is involved.

2.09 STORAGE OF MATERIALS

A. The Contractor shall confine equipment, apparatus, storage of materials and operations to limits indicated by directions of the Architect/Engineer and shall not bring material onto the site until they are needed for the progress of the Work.

B. The storage of materials on the site and within the building shall be in strict accordance with the instructions of the Architect/Engineer. Storage of materials within the building shall at no time exceed the design carrying capacity of the structural system.

C. Provide and maintain watertight storage sheds on the premises where directed, for storage of materials that might be damaged by weather. Sheds shall have wood floors raised at least 6" above the ground.

D. All materials affected by moisture shall be stored on platforms and protected from the weather.

E. During the construction of this Project, materials, construction sheds and earth stockpiles shall be located so as not to interfere with the installation of the utilities nor cause damage to existing lines.

F. The Contractor shall allot space to others for storage of their materials and erection of their sheds.

G. Should it be necessary at any time to move material sheds or storage platforms, the Contractor shall move the sheds at the Contractor's expense, when directed by the Owner or Architect/Engineer.

H. The Owner assumes no responsibility for materials stored in building or on the site. The

Contractor assumes full responsibility for damage during the storing of materials.

2.10 GLASS REPLACEMENT

A. The Contractor shall assume all costs of replacement of glass broken, cracked, or damaged by him. Glass scratched through improper cleaning shall be considered damaged and shall be replaced by the party that caused the damage.

2.11 CLEANING UP

A. The Contractor shall be financially responsible for clean-up operations. Clean-up must be timely as well as thorough in order to meet safety regulations and permit trades to perform without hindrance from dirt and debris. The Owner will police housekeeping and take appropriate steps to maintain clean, safe working conditions. If the Contractor fails to meet acceptable housekeeping requirements, then the Contractor shall be charged for services arranged for by the Owner.

B. The Contractor shall provide dumpsters throughout the site, schedule periodic removal of all construction waste, and remove all construction waste.

C. "Housekeeping" and clean-up shall be listed on the Schedule of Values and on the Applications and Certificates for Payment as an item of work.

2.12 ENCLOSURES

A. Furnish, install, and maintain for the duration of construction all required tarpaulins, barricades, canopies, warning signs, steps, bridges, platforms, fences and other temporary construction necessary for proper completion of the Work in compliance with all city, safety and other regulations.

END OF SECTION

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SECTION 01 60 00
MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 JOB CONDITIONS

A. Comply with applicable codes.

B. Accomplish work to avoid damage to property.

C. Provide fire protection.

PART 2 - PRODUCTS – DOES NOT APPLY

PART 3 - EXECUTION

3.01 PRODUCT DELIVERY

A. By manufacturer's normal means.

B. In original labeled containers.

C. Where applicable, with UL labeling on packages.

D. Contractor responsible for acceptance at site.

E. Schedule deliveries to avoid delaying Work, and to minimize space and duration of storage on site.

1. Sequence deliveries to avoid unnecessary additional construction of temporary protection.

F. Schedule and coordinate deliveries to avoid interference with Owner's operation.

G. Inspect items for damage upon delivery, reorder as required to avoid delays.

3.02 PRODUCT HANDLING AND STORAGE

A. Use methods to avoid damage to item or structure.

B. Protect weather fragile items from weather damage.

C. Handle and store bulk aggregates to avoid contamination.

D. Store to allow air circulation.

E. Store only in authorized areas.

1. Coordinate on site storage with Owner and other contractors working on site.

F. Replace or repair damaged items.

G. Uncrate, assemble, if required, and remove debris.

H. When off-site storage is utilized, perform re-handling to move items to site at no added cost.

3.03 CLEAN UP

A. Remove excess material from site.

B. Turn over to owner, excess materials scheduled to remain.

C. Clean debris from site and storage area.

1. Comply with construction waste recycling requirements specified in Division 1 Section 01 74 19 "Construction Waste Management."

2. Comply with environmental cleaning product requirements specified in Division 1 Section 01 74 00 "Cleaning."

D. Restore site storage areas to original condition or as directed by Architect or Owner.

END OF SECTION

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SECTION 01 71 00
SITE CONDITIONS

PART 1 - GENERAL

1.01 SITE CONDITIONS

A. All Contractors shall examine the site of the Project construction for ground structures and all other pertinent conditions under which work is to be performed.

B. Exercise extreme caution while performing work in the area of existing underground utility services and/or recently installed underground work.

C. Locate all underground utilities by careful hand excavation and provide all necessary and proper protection from damage during construction operations.

D. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Owner immediately for directions as to procedure. Cooperate with the Owner and public and private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.

E. Do not interrupt existing utilities serving facilities occupied and used by the Owner or others, except when permitted in writing by the Owner, and then only after temporary utility services have been provided.

F. Under no circumstances shall existing trees be damaged or removed without the consent of the Owner, or as indicated on the Drawings.

1.02 CHECKING LINES AND LEVELS

A. All Contractors shall thoroughly examine the existing conditions and be familiar with the work to be performed as hereinafter specified and as outlined on Drawings.

B. Each Contractor shall compare all levels given on Drawings with actual levels and shall call attention to discrepancies if any occur.

C. Each Contractor shall verify and document with the Architect/ Engineer all lines and levels and be responsible for the proper location of all his work.

END OF SECTION

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SECTION 01 71 23
FIELD ENGINEERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. General: This Section specifies administrative and procedural requirements for field-engineering services including, but not limited to, the following:

1. Land survey work.

1.03 QUALITY ASSURANCE

A. Surveyor Qualifications: Engage a land Surveyor registered in the state where the Project is located, to perform required land-surveying services.

PART 2 - PRODUCTS

2.01 Not Used

PART 3 - EXECUTION

3.01 EXAMINATION

A. Identification: The Owner will identify existing control points and property line corner stakes.

B. Verify layout information shown on the Drawings, in relation to the property survey and existing benchmarks, before proceeding to lay out the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

C. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points or requirements to relocate reference points because of necessary changes in grades or locations.

D. Promptly replace lost or destroyed Project control points. Base replacements on the original survey control points.

E. Establish and maintain a minimum of 2 permanent benchmarks on the site, referenced to data established by survey control points.

F. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site-work, investigate and verify the existence and location of underground utilities and other construction.

G. Prior to demolition and construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water service piping.

3.02 PERFORMANCE

A. Work from lines and levels established by the property survey. Establish benchmarks and markers to set lines and levels at each level of construction and elsewhere as needed to locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

1. Advise entities engaged in construction activities of marked lines and levels provided for their use.
2. As construction proceeds, check every major element for line, level, and plumb.

B. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference.

1. Record deviations from required lines and levels, and advise the Architect when deviations that exceed indicated or recognized tolerances are detected.

C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels, and control lines and levels required for mechanical and electrical work.

E. Existing Utilities: Furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, services, or other appurtenances located in or affected by construction. Coordinate with local authorities having jurisdiction.

END OF SECTION

SECTION 01 73 29
CUTTING AND PATCHING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. This Section establishes general requirements pertaining to cutting (including excavating), fitting, and patching of the work required to:
   a. Make the several parts fit properly.
   b. Uncover work to provide for installation, inspection, or both, of ill-timed work.
   c. Remove and replace work not conforming to requirements of the Contract Documents.
   d. Remove and replace defective work.

B. Related Work Described Elsewhere:

1. In addition to other requirements specified, upon the Owner's request, uncover work to provide for inspection by the Owner's Representative of covered work, and remove samples of installed materials for testing.
2. Do not cut or alter work performed under separate contract without the Owner's written permission.

1.02 QUALITY ASSURANCE

A. Perform all cutting and patching in strict accordance with pertinent requirements of these Specifications and, in the event no such requirements are determined, in conformance with the Owner's written direction.

1.03 SUBMITTALS

A. Request for the Owner's Consent:

1. Prior to cutting, which affects structural safety or does not affect structural safety, submit written request to the Owner for permission to proceed with cutting.
2. Should conditions of the work, or schedule, indicate a required change of materials or methods for cutting and patching, so notify the Owner and secure his written permission prior to proceeding. Changes in materials and methods will be at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 MATERIALS

A. For replacement of work removed, use materials, which comply with the pertinent Sections of these Specifications.

B. Material used for infill shall match surrounding construction unless noted otherwise.

PART 3 - EXECUTION

3.01 CUTTING & PATCHING

A. During Construction:

1. All openings, chases and lintels in new construction shown on Architectural and Structural Drawings shall be provided by the General Contractor. The mechanical, electrical, fire protection trades, and plumbing trades shall be responsible for providing sleeves, anchors, and inserts for establishing sizes and locations at proper time as to avoid cutting and patching.

B. Work In Place and Existing Construction:

1. For openings, anchors, and inserts required in new construction in place and in existing construction, the following will apply.

a. Perform cutting and removal by methods, which will prevent damage to other portions of the work and will provide proper surfaces to receive installation of repair and new work. Perform fitting and adjustments of products to provide specified tolerances and finishes.

b. Unless noted otherwise, the Contractor shall do all cutting required for installation of his work. Patching required because of such cutting shall be performed as follows:

i. Wherever cutting occurs within unexposed materials, or in materials, which are to remain unfinished when completed, patching shall be performed by Contractor who did cutting.

ii. Wherever cutting occurs in interior and mortar surfaces scheduled to remain exposed to view, the cutting and patching shall be performed by the Mason through the General Contractor and paid for by Contractor requested cutting. The masonry and mortar shall be cut and patched in toothed pattern matching the material and bond characteristics of the work in place or the existing masonry construction. Cross cutting of masonry units is not permitted.

iii. Wherever cutting occurs in finished surfaces, patching shall be performed by appropriate Trade Contractor and paid for by Contractor requested cutting. This includes, but is not limited to, painting of plastered and finished surfaces, ceramic tile, and acoustic materials and their supports.

C. Inspection:

1. Inspect existing conditions, including elements subject to movement or damage during cutting, excavating, backfilling, and patching.

2. After uncovering the work, inspect conditions affecting installation of new work.

D. Discrepancies:

1. If uncovered conditions are not as anticipated, immediately notify the Owner and secure needed directions.

2. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 PREPARATION PRIOR TO CUTTING

A. Provide all required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the work.

3.03 PERFORMANCE

A. Perform all required excavating and backfilling as required under pertinent Sections of these Specifications. Perform cutting and removal by methods, which will prevent damage to other portions of the work and will provide proper surfaces to receive installation of repair and new work.

END OF SECTION

SECTION 01 74 00
CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Throughout the construction period, each Contractor shall maintain the Project site in a standard of cleanliness as described in this Section.
2. In addition to standards described in this Section, comply with all requirements for cleaning up as described in various other Sections of these Specifications.

1.02 QUALITY ASSURANCE

A. Inspection:

1. Conduct daily inspection, and more often if necessary, to verify that requirements of cleanliness are being met.

B. Codes and Standards:

1. In addition to the standards described in this Section, comply with all pertinent requirements of governmental agencies having jurisdiction.

PART 2 - PRODUCTS

2.01 CLEANING MATERIALS AND EQUIPMENT

A. Provide all required personnel, equipment, and materials needed to maintain the specified standard of cleanliness.

PART 3 - EXECUTION

3.01 FINAL CLEANING

A. "Clean," for the purpose of this Article, and except as may be specifically provided otherwise, shall be interpreted as meaning the level of cleanliness generally provided by skilled commercial quality building maintenance equipment and materials.

B. Provide final cleaning of the work, at time indicated, consisting of cleaning each surface or unit of work to normal “clean” condition expected for a first class building cleaning and maintenance program. Comply with manufacturer’s instructs for cleaning operations.

C. Employ experience personnel or professional cleaners for final clearing.

D. Comply with manufacturers’ instructions for cleaning operations.

E. Remove labels which are not required as permanent labels.

F. Clean transparent materials (mirrors, window/door glass) to a polished condition; remove substance which are noticeable as vision obscuring.

G. Clean exposed exterior and interior hard-surfaced finishes, including metals, masonry, stone, concrete, painted surfaces, plastics, tile, wood, special coatings, and similar surfaces, to a dirt-free condition, free of dust, stains, films and similar noticeable distracting substances.

H. Removed debris and surface dust from limited-access spaces; roofs, plenums, shafts, trenches, equipment vaults, manholes, attics and similar spaces.

I. Broom clean concrete floors in non-occupied spaces; vacuum clean carpeted and similar soft surfaces.

J. Clean light fixtures, lamps and diffuser lenses.

K. Prior to completion of the Work, remove from the Project site all tools, surplus materials, equipment scrap, debris, and waste.

1. Interior:
    a. Visually inspect interior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
    b. Remove all traces of splashed materials from adjacent surfaces.
    c. Remove paint drippings, spots, stains, and dirt from finished surfaces.
2. Remove all packing materials and dispose of properly.
3. Polished surfaces: To surfaces requiring routine application of buffed polish, apply the polish recommended by manufacturer of the material being polished.

L. Schedule final commercial cleaning as approved by the Architect to enable the Owner to accept a completely clean building and site.

END OF SECTION

SECTION 01 74 20
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Owner has established that this project shall include proactive measures for waste management participation by all parties to the contract.

1. The purpose of this program is to ensure that during the course of the Project all diligent means are employed to pursue practical and economically feasible waste management and recycling options.
2. Upon award, each subcontractor shall be required to furnish documentation from suppliers or manufacturers regarding waste management and recycling options for those products and procedures furnished.
3. Waste disposal to landfills shall be minimized.

B. Definitions:

1. Waste: Any material that has reached the end of its intended use. Waste includes salvageable, returnable, recyclable and reusable construction materials that would otherwise be discarded or destroyed.
2. Construction waste: Solid wastes including, but not limited to, building materials, packaging materials, debris and trash resulting from construction operations.
3. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
4. Recycle: Recovery o demolition or construction waste for subsequent processing in preparation for reuse.
5. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
6. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation in to the work.
7. Hazardous waste: Any material or byproduct of construction that is regulated by the Environmental Protection Agency and that may not be disposed in any landfill or other waste end-source without adherence to applicable laws.
8. Trash: Any product or material unable to be returned, reused, recycled or salvaged.
9. Landfill: Any public or private business involved in the practice of trash disposal.
10. Waste Management Plan: A Project-related plan for the collection, transportation, and disposal of the waste generated at the construction site.

1.02 PERFORMANCE REQUIREMENTS

A. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of a minimum of 50% by weight of total waste generated by the Work.

B. Salvage/Recycle Requirements: Owner’s goal is to salvage and recycle as much non-hazardous construction waste as possible including the following materials:

1. Site clearing waste
2. Masonry and CMU
3. Lumber
4. Wood sheet material
5. Wood trim
6. Metals
7. Roofing

8. Insulation
9. Carpet and pad
10. Gypsum Board
11. Piping
12. Electrical conduit
13. Packaging: Regardless of salvage/recycle goal indicated above, salvage and recycle 100% of the following uncontaminated packaging materials:
    a. Paper
    b. Cardboard
    c. Boxes
    d. Plastic sheet and film
    e. Polystyrene packaging
    f. Wood crates
    g. Plastic pails

1.03 SUBMITTALS:

A. Project information: Construction Waste Management Plan.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:
    1. Material category
    2. Generation point of waste
    3. Total quantity of waste in tons
    4. Quantity of waste recycled, both estimated and actual in tons.
    5. Total quantity of waste recovered in tons.
    6. Total quantity of waste recovered as a percentage of total waste.

C. Waste Reduction Calculations: Before request for Substantial Completion, submit copies of calculated and of Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Record of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

E. Record of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

F. Recycling and processing Facility Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifest, weight tickets, receipts, and invoices.

G. Qualification data: For refrigerant recovery technician.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Waste Management Conference: Environmental Project Manager shall conduct conference at Project site to review methods and procedures related to waste management including but not limited to, the following:
    1. Review and discuss Waste Management Plan.
    2. Review requirements for documenting quantities of each type of waste and its disposition.
    3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.05 CONSTRUCTION WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be recycled, or disposed in landfill of incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling of transportation procedures.
1. Recycled Materials: Assign recycling to recycling subcontractor. Or list local receivers and processors, and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility. List hazardous material waste and disposal separately.
3. Handling and Transportation Procedures: include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

E. Waste Management plan shall include locations of sorting and waste storage facilities on Site Plan of Project.

PART 2 - PRODUCTS – NOT USED

PART 3 - EXECUTION

3.01 CONSTRUCTION WASTE MANAGEMENT PLAN IMPLEMENTATION:

A. Implement waste management plan as approved by Construction Manager. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract. Comply with the following procedures:
1. Define specific areas to facilitate separation of materials for recycling, salvage, reuse or return.

2. Separate construction waste by type at Project site to maximum extent practical.
3. Recycle and waste bin areas are too be maintained in an orderly manner and clearly marked to avoid contamination of materials. Inspect containers and bins weekly for contamination and remove contaminated materials found.
4. Do not mix recyclable materials.
5. Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpile to drain surface water. Cover to prevent windblown dust.
6. Store materials away from construction area. Do not store within drip line or remaining trees.
7. Store components off the ground and protect from weather.
8. Remove construction waste off Owner's property and transport to appropriate receiver or processor.

B. Hazardous Wastes: Store in secure areas and comply with following:
1. Hazardous wastes shall be separated, stored and disposed of in accordance with local and EPA regulations and additional criteria listed below:
a. Building products manufactured with PVC or containing chlorinated compounds shall not be incinerated.
b. Disposal of fluorescent tubes to open containers is not permitted.

C. Unused fertilizers shall not be co-mingled with construction waste.

D. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at the Project site.
1. Distribute waste management plan to everyone concerned within seven days of submittal return.
2. Distribute waste management plan to entities when they first begin work on the site. Review plan procedures and locations established for salvage, recycle, and disposal.

E. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
2. Comply with environmental controls specified in Division 1 Section 01 50 00 "Temporary Facilities, Construction Controls and Facilities."

F. Submit "Waste Reduction Progress Reports" each month as part of Application for Payment.
1. Materials identified in Report shall be reported by weight.
2. Where weight is not applicable, Contractor shall report materials by units applicable to material recipient.
3. Procure receipts or other validation of waste management procedures and include them as part of the submittal.

3.02 RECYCLING CONSTRUCTION WASTE – GENERAL

A. General: Recycle paper and beverage containers used by on site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by owner and Contractor.

3.03 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill for incinerator acceptable to authorities having jurisdiction.

1. Except otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials on site.

C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION

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SECTION 01 77 00
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.01 GENERAL

A. Substantial Completion: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, Certificate of Occupancy from local jurisdiction, and similar documents.
2. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities.
3. Prepare and submit Project Record Documents, Operation and Maintenance Manuals, and similar final record information.
4. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
5. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
6. Complete start-up testing of systems.
7. Submit test/adjust/balance reports.
8. Terminate and remove temporary facilities from Project site, along with mock-ups, construction tools, and similar elements.
9. Advise Owner of changeover in heat and other utilities.
10. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
11. Complete final cleaning requirements, including touch-up painting.
12. Touch-up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Substantial Completion Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request a single re-inspection when the Work identified in the previous inspection as incomplete is completed or corrected.
2. Additional Re-inspections: If additional re-inspections due to incomplete work are necessary, the Architect will be compensated on a time and material basis. The value of the work, performed by the Architect and its staff, shall be deleted from the Contractor’s Contract in the form of a Change Order. The Owner will then compensate the Architect directly.
3. Results of completed inspection will form the basis of requirements for Final Completion.

C. Final Completion: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 1 Section 01 29 00 - Payment Procedures.
2. Submit copy of Architect's substantial completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The copy of the list shall state that each item has been completed or otherwise resolved for

acceptance.

3. Submit three copies of completed “Contractor’s Affidavit of Payment of Debts and Claims”, AIA Document G706, with supporting documents attached thereto including:
    a. Three copies of completed “Contractor’s Affidavit of Release of Liens”, AIA Document G706A.
    b. Three copies of completed “Consent of Surety to Final Payment”, AIA Document G707.
    c. Three copies of completed “Consent of Surety to Reduction in or Partial Release of Retainage”, AIA Document G707A.
    d. Contractor’s release or waiver of liens, conditional upon receipt of final payment.
    e. Separate releases or waivers of liens from subcontractors and material and equipment suppliers.
4. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
5. Submit pest-control final inspection report and warranty.
6. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

D. Final Completion Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate of Final Acceptance after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
    1. Re-inspection: Request a single re-inspection when the Work identified in the previous inspection as incomplete is completed or corrected.
    2. Additional Re-inspections: If additional re-inspections due to incomplete work are necessary, the Architect will be compensated on a time and material basis. The value of the work, performed by the Architect and its staff, shall be deleted from the Contractor’s contract in the form of a Change Order. The Owner will then compensate the Architect directly.

E. List of Incomplete Items (punch list): Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
    1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
    2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

F. Project Record Documents: Do not use Project Record Documents for construction purposes. Protect Project Record Documents from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

G. Record Drawings: Maintain and submit one set of blue- or black-line white prints of Contract Drawings and Shop Drawings. Label marked-up Contract Drawing set as “Record Prints.”

H. Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
    1. Give particular attention to information on concealed elements that cannot be readily identified and recorded later.
        a. Mark Record Prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at the same location.

b. Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable paper cover sheets. Include identification on cover sheets.

I. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.

J. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating the operation and maintenance of each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data required in individual Specification Sections and as follows:

1. Operation Data: Include emergency instructions and procedures, system and equipment descriptions, operating procedures, and sequence of operations.
2. Maintenance Data: Include manufacturer's information, list of spare parts, maintenance procedures, maintenance and service schedules for preventive and routine maintenance, and copies of warranties and bonds.
3. Organize operation and maintenance manuals into suitable sets of manageable size. Bind and index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.

K. Warranties: Submit written warranties to the Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

1. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
2. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

L. Submit to WDNR for applicable Construction Site Storm Water Permit termination and certifications.

1. Provide copy of DNR accepted “Notice of Termination” to Architect and Owner.
2. For Tier 1 and Tier 2 Industrial Facilities, submit the “No Exposure Certification” to the DNR prior to starting facility operations.

PART 2 - GENERAL

2.01 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.01 CLOSEOUT PROCEDURES

A. Demonstration and Training: Instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Provide instructors experienced in operation and maintenance procedures.

2. Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at the start of each season.
3. Schedule training with Owner, through Architect, with at least seven days advance notice.
4. Coordinate instructors, including providing notification of dates, times, length of instruction, and course content.
5. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. For each training module, develop a learning objective and teaching outline. Include instruction for system design and operational philosophy, review of documentation, operations, adjustments, troubleshooting, maintenance, and repair.

B. Final Cleaning: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and federal and local environmental and antipollution regulations.

C. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

D. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
1. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
2. Sweep paved areas broom clean. Remove spills, stains, and other foreign deposits.
3. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
4. Remove construction equipment and surplus material from Project site.
5. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains.
6. Remove debris and surface dust from limited access spaces.
7. Sweep concrete floors broom clean in unoccupied spaces.
8. Vacuum carpet and similar soft surfaces; shampoo if visible soil or stains remain.
9. Clean transparent materials, including mirrors and glass. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken transparent materials. Polish mirrors and glass.
10. Remove labels that are not permanent.
11. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored.
    a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
    b. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication and foreign substances.
    c. Clean plumbing fixtures to a sanitary condition, free of stains.
    d. Replace disposable air filters and clean permanent air filters.
    e. Clean light fixtures, lamps, globes, and reflectors. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
12. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
13. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or

dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION

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SECTION 01 78 23
OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. To aid in the continued instruction of operating and maintenance personnel, and to provide a positive source of information regarding the products incorporated in the Work, furnish and deliver the data described in this Section and in pertinent other Sections of these Specifications.

B. Related Work Described Elsewhere:

1. Make all submittals in strict accordance with the provisions of Section 01 33 00 and the Special Conditions of the Contract.
2. Required contents of submittals may also be amplified in other pertinent Sections.

1.02 QUALITY ASSURANCE

A. In preparation of data required by this Section, use only personnel who are thoroughly trained and experienced in operation and maintenance of the described items, completely familiar with the requirements of this Section, and skilled in technical writing to the degree needed for communicating the essential data.

1.03 SUBMITTALS

A. Preliminary:

1. Submit two copies of a preliminary draft of the proposed manual or manuals to the Architect/Engineer for review and comments. Architect will submit one manual to the Owner for its review.

B. Final:

1. Unless otherwise directed in other pertinent Sections, or in writing by the Architect/Engineer, submit three copies of the final manual to the Architect/Engineer prior to indoctrination of operation and maintenance personnel.

PART 2 - PRODUCTS

2.01 INSTRUCTION MANUALS

A. General:

1. Where instructions are required to be submitted under other Sections of these Specifications, prepare in accordance with the following:

B. Format:

1. Size: 8-1/2" x 11".
2. Paper: White bond, at least 20 lb. weight.
3. Text: Neatly typewritten.
4. Drawings: 11" in height preferable; bind in with text; foldout acceptable; larger drawings acceptable, but fold to fit within the manual and provide a drawing pocket inside rear cover or bind in with text.
5. Flysheets:
   a. Separate each portion of the manual with neatly prepared flysheets briefly describing contents of the ensuing portion; flysheets may be in color.
6. Binding:
   a. Use heavy-duty plastic or cardboard covers with binding mechanism concealed inside the manual; 3-ring binders will be acceptable; all binding shall be subject

to the Architect's approval.

7. Measurements:
    a. Show the U.S. measurements plus the SI equivalents.

C. Covers:
1. Provide front and back covers for each manual, using durable material approved by the Architect/Engineer and clearly identified on or through the front cover with at least the following information:
    a. PROJECT NAME
    b. PROJECT OWNER
    c. LOCATION
        i. (general subject of this manual)
        ii. (space for approval signature of the Architect/Engineer and approval date)

D. Contents: Include at least the following:
1. Neatly typewritten index near the front of the manual, giving immediate information as to location within the manual of all emergency data regarding the installation.
    a. Complete instructions regarding operation and maintenance of all equipment involved, including lubrication, disassembly, and reassembly.
    b. Complete nomenclature of all parts of all equipment.
    c. Complete nomenclature and part number of all replaceable parts, name and address of nearest vendor, and all other pertinent data regarding procurement procedure.
    d. Electrostatic copy of all guarantees and warranties issued.
    e. Manufacturers' bulletins, cuts, and descriptive data, where pertinent, clearly indicating the precise items included in this installation and deleting, or otherwise clearly indicating, all manufacturer's data with which this installation is not concerned.
    f. Such other data as required in other pertinent Sections of these Specifications.

PART 3 - EXECUTION

3.01 INSTRUCTION MANUALS

A. Preliminary:
1. Prepare a preliminary draft of each proposed manual. Show general arrangement, nature of contents in each portion, probable number of drawings and their size, and proposed method of binding and covering. Secure the Architect/Engineer's approval prior to proceeding with final.

B. Final:
1. Complete the manuals in strict accordance with the approved preliminary drafts and the Architect/Engineer's review comments.

C. Revisions:
1. Following the indoctrination and instruction of operation and maintenance personnel, review all proposed revisions of manuals with the Architect/Engineer. If the Contractor is required by the Architect to revise previously approved manuals, compensation will be made as provided under "Changes to the Contract" in the General Conditions.

END OF SECTION

SECTION 01 78 36
WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes administrative and procedural requirements for warranties required by the Contract Documents, including manufacturers' standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractor's period for correction of the Work.

B. Related Sections: The following Sections contain requirements that relate to this Section:

1. Division 1 Section 01 33 00 "Submittal Procedures" specifies procedures for submitting warranties.
2. Divisions 2 through 48 Sections for specific requirements for warranties on products and installations specified to be warranted.
3. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

C. Disclaimers and Limitations: Manufacturers' disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products. Manufacturers' disclaimers and limitations on product warranties do not relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

D. Separate Prime Contracts: Each Prime Contractor is responsible for warranties related to its own Contract.

1.03 DEFINITIONS

A. Standard product warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.

B. Special warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner.

1.04 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting failed or damaged warranted construction, remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of the Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.

D. Owner's 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, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

E. Where the Contract Documents require a special warranty, or similar commitment on the Work or part of the Work, the Owner reserves the right to refuse to accept the Work, until the Contractor presents evidence that entities required to countersign such commitments are willing to do so.

1.05 SUBMITTALS

A. Submit written warranties to the Architect prior to the date certified for Substantial Completion. If the Architect's Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Architect.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Architect within 15 days of completion of that designated portion of the Work.

B. When the Contract Documents require the Contractor, or the Contractor and a subcontractor, supplier or manufacturer to execute a special warranty, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

C. Prepare a written document utilizing the appropriate form, ready for execution by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Submit a draft to the Owner, through the Architect, for approval prior to final execution.

1. Refer to Divisions 2 through 48 Sections for specific content requirements and particular requirements for submitting special warranties.

D. Form of Submittal: At Final Completion compile 3 copies of each required warranty properly executed by the Contractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the Table of Contents of the Project Manual.

E. Bind warranties and bonds in heavy-duty, commercial-quality, durable 3-ring, vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.

1. Provide heavy paper dividers with celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of the installer.
2. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project title or name, and name of the Contractor.
3. When warranted construction requires operation and maintenance manuals, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS

2.01 Not Used

PART 3 - EXECUTION

3.01 LIST OF WARRANTIES

A. Schedule: Provide warranties on products and installations as specified in the following Sections:

1. Section 22 10 00.....Plumbing
2. Section 23 00 00.....Heating, Ventilating and Air Conditioning
3. Section 23 09 00.....Controls & Instrumentation
4. Section 26 29 13.....Starters
5. Section 26 24 16.....Panelboards
6. Section 26 20 00.....Distribution Panelboard
7. Section 26 50 00.....Lighting
8. Section 28 31 00.....Fire Alarm System
9. Section 28 23 00.....Voice and Data Systems
10. Section 26 09 00.....Lighting Control Equipment

END OF SECTION

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SECTION 01 78 39
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Throughout progress of the work, each Contractor shall maintain an accurate record of all changes in the Contract Documents, as described in Article 3.01 below.
2. Upon completion of the work of this contract, transfer the recorded changes to a set of Record Documents, as described in Article 3.02 below.

B. Related Work Described Elsewhere:

1. Section 01 33 00: Submittal Procedures

1.02 QUALITY ASSURANCE

A. General:

1. The Contractor shall delegate the responsibility for maintenance of Record Documents to one person on the Contractor's staff as approved in advance by the Architect/Engineer.

B. Accuracy of Records:

1. Thoroughly coordinate all changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other documents where such entry is required to properly show the change. Accuracy of records shall be such that future searches for items shown in the Contract Documents may reasonably rely on information obtained from the approved Record Documents.

C. Timing of Entries:

1. Make all entries within 24 hours after receipt of information.

1.03 SUBMITTALS

A. Final Submittal:

1. Prior to submitting Request for Final Payment, submit the final Record Documents to the Architect/Engineer and secure his approval.

1.04 PRODUCT HANDLING

A. Use all means necessary to maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the work and transfer of the recorded data to the final Record Documents. In the event of loss of recorded data, use all means necessary to secure the data to the Architect/Engineer's approval; such means shall include, if necessary in the opinion of the Architect/Engineer, removal and replacement of concealing materials and, in such case, all replacements shall be to the standard originally specified in the Contract Documents.

PART 2 - PRODUCTS

2.01 RECORD DOCUMENTS

A. Job Set:

1. Promptly following Award of Contract, secure from the Architect/ Engineer at no charge to the Contractor, one complete set of all documents comprising the Contract.

B. Final Record Documents:

1. At a time near the completion of the work, secure from the Architect/Engineer at no

charge to the Contractor, one complete set of all Drawings and Specifications included in the Contract.

PART 3 - EXECUTION

3.01 MAINTENANCE OF JOB SET

A. Identification:

1. Immediately upon receipt of the job set described in Paragraph 2.01 above, identify each of the Documents with the title "Record Documents - Job Set".

B. Preservation:

1. Considering the Contract completion time, the probable number of occasions upon which the job set must be taken out for new entries and for examination, and the conditions under which these activities will be performed, devise a suitable method for protecting the job set to the approval of the Architect/Engineer.
    a. Do not use the job set for any purpose except entry of new data and for review by the Architect/Engineer, until start or transfer of data to final Record Documents.
    b. Maintain the job set at the site of Work as that site is designated by the Architect/Engineer.

C. Making Entries on Drawings:

1. Using an erasable colored pencil (not ink or indelible pencil), clearly describe the change by note and by graphic line, as required. Date all entries. Call attention to the entry by a "cloud" around the area or areas affected. In the event of overlapping changes, different colors may be used for each of the changes.

D. Making Entries on Other Documents:

1. Where changes are caused by directives issued by the Architect/Engineer, clearly indicate the change by note in ink, colored pencil, or rubber stamp.
2. Where changes are caused by Contractor - originated proposal approved by the Architect/Engineer, including inadvertent errors by the Contractor which have been accepted by the Architect/Engineer, clearly indicate the change by note in erasable colored pencil.
3. Make entries in the pertinent Documents as approved by the Architect/Engineer.

E. Conversion of Schematic Layouts:

1. In most cases on the Drawings, arrangement of conduits and circuits, piping, ducts, and other similar items, is shown schematically and is not intended to portray precise physical layout. Final physical arrangement is as deter-mined by the Contractor, subject to the Architect/Engineer's approval. However, design of future modifications of the facility may require accurate information as to the final physical arrangement of items which are shown only schematically on the Drawings.
2. Show on the job-set of Record Drawings, by dimension accurate to within 1", the center line of each run of items such as are described in Paragraph 3.01.E.1. above. Clearly identify the item by an accurate note such as "cast iron drain", "galv. water", etc. Show by symbol or note the vertical location of the item ("under slab", "in ceiling plenum", "exposed", etc.). Make all identification sufficiently descriptive that it may be related reliably to the Specifications.
3. The Architect/Engineer may waive the requirements for conversion of schematic data where, in the Architect/Engineer's judgment, such conversion serves no beneficial purpose. However, do not rely upon waivers being issued except as specifically issued in writing by the Architect/Engineer.
4. Timing of Entries: Be alert to changes in the work from how it is shown in the Contract Documents. Promptly, and in no case later than 24 hours after the change

has occurred and been made known to the Contractor, make the entry or entries required.

5. Accuracy of Entries: Use all means necessary, including the proper tools for measurement, to determine actual locations of the installed items.

3.02 FINAL RECORD DOCUMENTS

A. General:

1. The purpose of the final Record Documents is to provide factual information regarding all aspects of the work, both concealed and visible, to enable future modification of design to proceed with lengthy and expensive site measurement, investigations, and examination.

B. Approval of Recorded Data Prior to Transfer:

1. Following receipt of the documents described in Paragraph 2.01-B above, and prior to start of transfer of recorded data thereto; secure a review by the Architect of all recorded data. Make all required revisions.

C. Transfer of Data to Drawings:

1. Carefully transfer all change data shown on the job-set of Record Drawings to the corresponding sepia, coordinating the changes as required, and clearly indicating at each affected detail and other drawing the full description of all changes made during construction and the actual location of items described in Paragraph 3.01-E above. Call attention to each entry by drawing a "cloud" around the area or areas affected. Make all change entries on the Drawings neatly, consistently, and in ink or crisp black pencil.

D. Transfer of Data to Other Documents:

1. If the Documents other than Drawings have been kept clean successfully during progress of the Work, and if entries have been sufficiently orderly thereon to the approval of the Architect/Engineer, the job-set of those Documents (other than Drawings) will be accepted by the Architect/Engineer as final Record Documents for those Documents. If any such Document is not so approved by the Architect/Engineer, secure a new copy of that Document from the Architect/Engineer at the Architect/Engineer's usual charge for reproduction; carefully transfer the change data to the new copy and to the approval of the Architect/ Engineer.

E. Review and Approval:

1. Submit the completed total set of Record Documents to the Architect as described in Paragraph 1.03 above. Participate in review meeting or meetings as required by the Architect/Engineer, make all required changes in the Record Documents, and promptly deliver the final Record Documents to the Architect/ Engineer. Architect will deliver a copy of the Contractor's final Record Documents to the 74660.

3.03 CHANGES SUBSEQUENT TO ACCEPTANCE

A. The Contractor shall have no responsibility for recording changes in the Work subsequent to acceptance of the Work by the Owner, except for changes resulting from replacements, repairs, and alterations made by Contractor as part of his guarantee.

END OF SECTION

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SECTION 02 30 00
SUBSURFACE INVESTIGATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Test borings have been made and boring data are attached to the end of this project manual as appendix item 'A'; however, these records do not form a part of the Contract Documents but are provided for information only.

B. Neither the Owner, nor the Architect/Engineer guarantee continuity of conditions indicated at the boring locations.

C. Contractor will have to interpret the soil boring data and be satisfied as to the materials to be excavated and materials upon which fill or other materials may be placed.

D. Bidders should visit the site and acquaint themselves with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but all such investigations shall be performed only under time schedules and arrangements approved in advance by the Architect/Engineer.

1.02 QUALITY ASSURANCE

A. Adjustment of Work:

1. Readjust all work performed that does not meet technical or design requirements but make no deviations from the Contract Documents without specific and written approval from the Architect/Engineer.
2. Soils Engineer will be retained by the Contractor to observe performance of work in connection with excavating, filling, backing and grading.

END OF SECTION

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SECTION 03 10 00
CONCRETE FORMS AND ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Work under this Section includes all labor, materials, equipment, and services necessary to complete the concrete forms and accessories work as shown on the Drawings and herein specified.

B. Products Installed But Not Supplied Under This Section:

1. Built-in anchors, inserts, and bolts for connection of other materials.
2. Built-in sleeves, thimbles, anchor slots, and water stops.
3. Masonry accessories attached to formwork.
4. Metal fabrications attached to formwork.
5. Flashing, reglets, and sheet metal attached to formwork.

C. Related Sections:

1. Section 03 20 00: Concrete Reinforcement
2. Section 03 30 00: Cast-In-Place Concrete

1.02 DEFINITIONS

A. Non-Architectural Concrete Surfaces: Formed surfaces where appearance is not a design consideration.

1.03 SUBMITTALS

A. General:

1. Comply with provisions of Section 01 33 00.

B. Submit no later than ten days after notice to proceed or five days prior to pour, whichever is earlier.

C. Product data for proprietary materials and items, including forming accessories, joint systems, and others if requested by Architect.

D. Shop drawings, if requested by the Architect/Engineer:

1. Conform to ACI 301.
2. Indicate fabrication and erection of forms for finished concrete surfaces. Show form construction including jointing, special form joints or reveals, location and pattern of form tie placement, and other items that affect exposed concrete visually.
3. Architect/Engineer's review is for general architectural applications and features only. The design, engineering, safety, and construction of formwork, re-shoring, and back-shoring (including for structural stability and efficiency) shall remain the sole responsibility of the Contractor.
4. Calculations for formwork, re-shoring, and back-shoring as applicable, sealed by a Professional Engineer licensed in the state applicable to work and Project location.
5. Obtain acceptance of shop drawings prior to fabrication.

E. Samples of materials, if requested by Architect/Engineer, including names, sources, and descriptions, as follows:

1. Form ties.
2. Form liners.
3. Reglets.
4. Waterstops.

5. Expansion joint materials.
6. Others, if requested by the Architect/Engineer.

1.04 QUALITY ASSURANCE

A. General: Conform to ACI 347: "Recommended Practice for Concrete Formwork".

B. Design Criteria:
1. All formwork is subject to the Architect/Engineer's approval.
2. The design, engineering, safety, and construction shall remain the responsibility of the Contractor.
3. Conform to ACI 347, "Recommended Practice for Concrete Formwork"
4. Formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.
5. Side forms of footings may be omitted and concrete placed directly against excavation only when requested by Contractor and accepted by Architect/Engineer. When omission of forms is accepted, provide additional concrete two (2) inches beyond the minimum design profiles and dimensions of the footings as detailed.

C. Regulatory Requirements:
1. Conform to requirements of local, state, and federal rules and regulations applicable to work and Project location.
2. Conform to the applicable requirements and recommendations of the following codes, specifications, and standards except as modified by the Contract Documents and herein:
a. American Concrete Institute, ACI 117 - 90 "Standard Specifications for Tolerances for Concrete Construction and Materials."
b. American Concrete Institute, ACI 301 - 99 "Specifications for Structural Concrete."
c. American Concrete Institute, ACI 302.1R "Guide for Concrete Floor and Slab Construction".
d. American Concrete Institute, ACI 318 - 02 "Building Code Requirements for Structural Concrete."
e. American Concrete Institute, ACI 304.2R - 96 "Placing Concrete by Pumping Methods."
f. American Welding Society, AWS D1.4-81 "Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction."

D. Where provisions of the above codes and standards are in conflict with each other or the building code in force for this Project, the most stringent shall govern.

E. Allowable Tolerances:
1. Non-Architectural Concrete: Conform to ACI 347, Article 3.3.

F. Where a conflict occurs between the standard specified, the more stringent shall govern.

1.05 DELIVERY, STORAGE, AND HANDLING

A. On delivery to job site, place materials in area protected from weather.

B. Store materials above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.

C. Handle materials to prevent damage.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Conform to ACI 347-78 "Recommended Practice for Concrete Formwork", Chapter 4 - Materials for Formwork.

B. Forms for Exposed Finish Concrete Surfaces:

1. Construct formwork with plywood, metal, metal-framed plywood-faced or other panel type materials acceptable to Architect/Engineer, to provide continuous, straight, smooth exposed surfaces.
2. Formwork shall be mortar-tight and constructed of a material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
3. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on Drawings.
4. Temporary openings may be provided on all walls and forms to limit the free fall of the concrete to less than four feet and should be so located as to facilitate the placing and consolidation of the concrete. The ports shall be spaced no more than 6 feet apart to limit the horizontal flow of concrete.

C. Forms for Unexposed Finish Concrete Surfaces:

1. Construct formwork with plywood, board, metal, or other acceptable material.
2. Provide lumber dressed on at least two edges and one side for tight fit.

D. Forms for Textured Finish Concrete Surfaces:

1. Units of face design, size, arrangement, and configuration to match Architect/Engineer's control sample. Provide solid backing and form supports to ensure stability of textured form liners.

E. Forms for Cylindrical Columns and Supports:

1. Metal, glass-fiber-reinforced plastic, or paper or fiber tubes that will produce smooth surfaces without joint indications. Provide units with sufficient wall thickness to resist wet concrete loads without deformation.

F. Pan-Type Forms:

1. Glass-fiber-reinforced plastic or formed steel, stiffened to support weight of placed concrete without deformation.

G. Carton Forms:

1. Biodegradable paper surface, treated for moisture-resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

H. Form Ties and Accessories:

1. Provide factory-fabricated, adjustable-length, removable or snap-off form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.
2. Provide ties so that portion remaining within concrete after removal of exterior parts is at least 1-1/2" inside the outer concrete surface. Cutting ties back from face of wall or use of wire ties will not be permitted.
3. Provide ties that, when removed, will leave holes not larger than 1 inch (25 mm) in diameter in the concrete surface.
4. Ties shall be fitted with tapered rubber plugs and plug holes shall be filled with non-shrink grout after forms are removed where concrete is exposed to view. Where the walls have earth on both sides, tapered rubber plugs on the ties will not be required. In these areas snap ties will be sufficient.

I. Form Coatings:

1. Provide commercial formulation compounds that will not bond with, stain, nor

adversely affect concrete surfaces, and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water of curing compounds.

PART 3 - EXECUTION

3.01 GENERAL

A. Conform to ACI 347 "Recommended Practice for Concrete Formwork", Chapter 3, Construction.

B. Allowable Tolerances: Construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 347 "Recommended Practice for Concrete Formwork", and as follows:

1. Variation from plumb in lines and surfaces: 1/4" per 10 feet, but not more than 1".
2. Variation from level or from grades indicated on the Drawings: for exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, 1/4" in any bay or 20 feet max. and 1/2" in 40 feet or more.
3. Variation in cross-sectional dimensions of thickness of slabs and walls: - 1/4" and + 1/2".
4. Variations in footings plan dimensions: - 1/2" and + 2"; misplacement or eccentricity: 2% of the footing width in direction of misplacement but not more than 2"; thickness reduction: 5%.

C. Provide for openings, offsets, key-ways, screeds, bulkhead, and other features required.

D. Before concrete placement check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and location of concrete members and stability of forming systems.

E. Limit the free fall of the concrete to less than four feet. Temporary openings may be provided on walls and forms to accomplish this, and should be so located as to facilitate the placing and consolidation of the concrete. The ports shall be spaced no more than 6 feet apart to limit the horizontal flow of concrete.

F. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

G. Embedded Items:

1. Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete.
2. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items to be attached thereto.
3. Provide metal inserts for anchorage of materials or equipment to concrete construction, not supplied by other trades and as required for the work.

H. Coat form contact surfaces with form-coating compound before reinforcement is placed.

3.02 FORMWORK

A. Forms for exposed concrete:

1. Provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
2. Use extra studs, walers and bracing as required to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form materials which will produce bow.
3. Form molding shapes, recesses and projections with smooth-finish materials, and install in forms with sealed joints to prevent displacement.

B. Corner treatment for all concrete:

1. Form chamfers with 3/4" x 3/4" strips, accurately formed and surfaced to produce uniformly straight lines and tight edge joints.
2. Extend terminal edges to limit and miter chamfer strips at changes in direction.

3.03 REMOVAL OF FORMWORK

A. Formwork not supporting concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operations, and provided that curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs and other structural elements may not be removed in less than 14 days, and not until concrete has attained design minimum 28 day compressive strength.

END OF SECTION

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SECTION 03 20 00
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Work under this Section includes all labor, materials, equipment, and services necessary to complete the concrete reinforcement work as shown on the Drawings and herein specified.

B. Products Supplied But Not Installed Under This Section:

1. Epoxy Coated Concrete reinforcement.

C. Related Sections:

1. Section 03 10 00: Concrete Forms and Accessories
2. Section 03 30 00: Cast-In-Place Concrete

1.02 SUBMITTALS

A. General:

1. Comply with provisions of Section 01 33 00.

B. Submit no later than ten days after notice to proceed or five days prior to pour, whichever is earlier.

C. Product data for proprietary materials and items, including reinforcement, reinforcing bar couplers, reinforcing bar chairs, dowels and dowel baskets, and others if requested by Architect.

D. Shop drawings as follows:

1. Conform to ACI 301.
2. Placing Drawings:
   a. Detail fabricating, bending, and placing of reinforcement.
   b. Show sizes and dimensions for fabrication of reinforcing steel and bar supports.
   c. Show sizes and dimensions for placing of reinforcing steel and bar supports.
   d. Show sizes and dimensions for fabrication of reinforcing wire fabric and supports.
   e. Show sizes and dimensions for placing of reinforcing wire fabric and supports.
   f. Indicate reinforcement sizes, spacing dimensions, locations, and quantities. Show bar schedules and diagrams of bent bars, stirrup spacing dimensions, splicing, and supporting and spacing devices. Include any special reinforcing required.
   g. Conform to American Concrete Institute, ACI SP-66 - 94 "ACI Detailing Manual" providing full wall elevations.
   h. Use 24" x 36" paper size and format per "Fig. 20-Recommended Layout for Placing Drawings" in the American Concrete Institute "Details and Detailing of Concrete Reinforcement (ACI 315-80)*(Revised 1986)."
3. Certificates:
   a. Provide mill test certificates identifying chemical and physical analysis of each load of reinforcing steel delivered to the supplier.
4. Initial submittal of reinforcement shop drawings shall be complete. No partial submittals will be accepted.
5. Obtain acceptance of shop drawings prior to fabrication.

E. Samples of materials if requested by Architect, including names, sources, and descriptions, as follows:
   1. Fiber reinforcement.
   2. Welded wire reinforcement.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:
   1. Conform to requirements of local, state, and federal rules and regulations applicable to work and project location.
   2. Conform to the applicable requirements and recommendations of the following codes, specifications, and standards except as modified by the Contract Documents and herein:
      a. American Concrete Institute, ACI 117 - 90 “Standard Specifications for Tolerances for Concrete Construction and Materials.”
      b. American Concrete Institute, ACI 301 - 99 "Specifications for Structural Concrete."
      c. American Concrete Institute, ACI 302.1R "Guide for Concrete Floor and Slab Construction".
      d. American Concrete Institute, ACI 315 - 99 “Details and Detailing of Concrete Reinforcement.”
      e. American Concrete Institute, ACI 318 - 02 “Building Code Requirements for Structural Concrete.”
      f. American Concrete Institute, ACI SP-66 - 94 "ACI Detailing Manual”
      g. American Welding Society, AWS D1.4-81 “Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction.”
      h. American Welding Society, AWS D4 Structural Welding Code – Reinforcing Steel.
      i. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

B. Where provisions of the above codes and standards are in conflict with each other or the building code in force for this Project, the most stringent shall govern.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.

B. Handle and store materials to prevent damage and accumulation of dirt or excessive rust.

C. Deliver and store welding electrodes in accord with AWS D 1.4.

1.05 REFERENCE STANDARDS

A. ACI 301 - Specification for Structural Concrete for Buildings.

B. AWS D.4 - Structural Welding Code - Reinforcing Steel.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Epoxy Coated Reinforcing Bars:
   1. “Standard Specification for Epoxy-Coated Steel Reinforcing Bars”, ASTM A 775 (ASTM A 775M), patching material supplied, surface prepared to meet SSPC-Vis 1.

B. Bar Mats:

1. “Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement”, ASTM A 184 (ASTM A 184M), clipped.

C. Wire:

1. “Standard Specification for Steel Wire, Plain, for Concrete Reinforcement”, ASTM A 82, plain, cold-drawn steel.
2. “Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement”, ASTM A 496.

D. Welded Wire Fabric:

1. “Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete”, ASTM A 185, flat sheets.
2. “Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete”, ASTM A 497, flat sheets.
3. Provide sheet welded wire fabric for concrete reinforcement. Rolled welded wire fabric is not permitted.

E. Coated Wire and Welded Wire Fabric:

1. “Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement”, ASTM A 884 (ASTM A 884M), Class A, patching material supplied, surface prepared to meet SSPC-Vis 1.

F. Reinforcement Supports:

1. Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place. Do not float bars into place or use bricks.
2. Use wire bar-type supports complying with CRSI specifications. Do not use wood, brick, and other unacceptable materials.
3. For slabs-on-grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
4. For footings, use chairs for reinforcing. Do not float bars into place or use bricks.
5. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).
6. Uncoated or coated to match reinforcement.

G. Tie Wire: Annealed steel, black, 16 gauge minimum. Uncoated or coated to match reinforcement.

2.02 ACCESSORIES

A. Welding Electrodes:

1. AWS A5.1, low hydrogen, E70 series.

2.03 FABRICATION

A. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice". In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.

B. Reinforcement with any of the following defects will not be permitted in the Work.

1. Bar lengths, depths and bends exceeding specified fabrication tolerance.
2. Bend or kinks not indicated on Drawings or final shop drawings.
3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Placement:
   1. Comply with the requirements in Chapters 5-6 of ACI 301.

B. Steel Adjustment:
   1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.
   2. Do not move bars beyond allowable tolerances without concurrence of Architect/Engineer.
   3. Do not heat, bend, or cut bars without concurrence of Architect/Engineer.

C. Splices:
   1. Lap splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
   2. Welding: Perform in accordance with AWS D 1.4.
   3. Do not splice bars except at locations shown on drawings without concurrence of Architect/Engineer.

D. Wire Fabric:
   1. Install in longest practicable length.
   2. Lap adjoining pieces one full mesh minimum and lay splices with 16 gauge wire.
   3. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.
   4. Offset end laps in adjacent widths to prevent continuous laps.
   5. Provide chairs and bolsters to properly locate fabric.

E. Bar and Fabric Supports:
   1. Provide sufficient numbers of supports and of strength to carry bar and fabric reinforcement.
   2. Do not place reinforcing bars more than 2" beyond the last leg of any continuous bar support.
   3. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

F. Protect reinforcing with minimum thickness of concrete cover for cast-in-place concrete as follows; unless otherwise noted on the Drawings.
   1. Cast against and permanently exposed to earth — 3"
   2. Exposed to earth or weather:
      a. #6 through #18 bars — 2"
      b. #5 bars, 5/8" wire and smaller — 1-1/2"
   3. Not exposed to weather or in contact with the ground.
      a. Slabs, walls:
         i. #14 and #18 bars — 1-1/2"
         ii. #11 and smaller — 3/4"
      b. Beams, girders, columns:
      c. Principle reinforcement, ties, stirrups, spirals — 1-1/2"

G. Cleaning: Remove dirt, grease, oil, loose mill scale, excessive rust, and foreign matter that will reduce bond with concrete.

H. Installation:

1. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
2. Arrange, space and securely tie bars and bar supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that ends are directed away from exposed concrete surfaces.

END OF SECTION

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SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Work under this Section includes all labor, materials, equipment, and services necessary to complete the cast-in-place concrete work as shown on the Drawings and herein specified.

B. Products Installed But Not Supplied Under This Section
   1. Concrete Accessories
   2. Concrete Reinforcement
   3. Joint Sealers

C. Related Sections
   1. Division 1 Section 01 45 00 – Quality Control
   2. Division 3 Section 03 10 00– Concrete Forms and Accessories
   3. Division 3 Section 03 20 00– Concrete Reinforcement
   4. Division 7 Section 07 92 00– Joint Sealers

1.02 SUBMITTALS

A. General:
   1. Comply with provisions of Section 01 33 00.

B. Submit no later than ten days after notice to proceed or five days prior to pour, whichever is earlier.

C. Product data for proprietary materials and items, including admixtures, patching compounds, curing compounds, hardeners, and dry-shake finish materials, and others if requested by Architect.

D. Samples of materials, if requested by the Architect, including names, sources, and descriptions, as follows:
   1. Color finishes.
   2. Aggregate.
   3. Others, if requested by the Architect.

E. Concrete mix designs indicating material content per cubic yard for each class of concrete to be furnished. Concrete mix properties shall be indicated. Each mix design shall include the following as a minimum.
   a. Dry weights of cementitious materials.
   b. Saturated surface-dried weights of fine and coarse aggregate with ASTM grading size number.
   c. Quantities, type and name of admixtures with manufacturer's recommendations for proportioning.
   d. Weight of water.
   e. Specified Average Compressive Strength (f'_c) and Required Average Compressive Strength (f'_{cr}).
   f. Water/Cementitious Materials (W/C) Ratio.
   g. Slump.

F. Mix design tests.

G. Laboratory test reports for each material in concrete mix. In lieu of submitting laboratory test reports for each material in concrete mix, submit material certificates signed by the

manufacturer and the Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

H. Certificates:

1. Manufacturer and Contractor certifications that materials meet specification requirements.
2. Ready-mix delivery tickets, ASTM C 94.

I. Minutes of pre-installation conference.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Conform to requirements of local, state, and federal rules and regulations applicable to work and project location.
2. Conform to the applicable requirements and recommendations of the following codes, specifications, and standards except as modified by the Contract Documents and herein:
   a. American Concrete Institute, ACI 117 - 90 “Standard Specifications for Tolerances for Concrete Construction and Materials.”
   b. American Concrete Institute, ACI 301 - 99 "Specifications for Structural Concrete."
   c. American Concrete Institute, ACI 302.1R - 96 "Guide for Concrete Floor and Slab Construction".
   d. American Concrete Institute, ACI 318 - 02 “Building Code Requirements for Structural Concrete.”
   e. American Concrete Institute, ACI 304R-00 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete."
   f. American Concrete Institute, ACI 304.2R - 96 "Placing Concrete by Pumping Methods."
   g. American Concrete Institute, ACI 305R - 99 "Hot Weather Concreting."
   h. American Concrete Institute, ACI 306R - 97 "Cold Weather Concreting."
   i. American Concrete Institute, ACI 308R - 01 "Guide to Curing Concrete."
   j. ASTM International, ASTM C309 – 11 “Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.”
   k. American Welding Society, AWS D1.4-81 “Recommended Practices for Welding Reinforcing Steel, Metal Inserts, and Connections in Reinforced Concrete Construction.”
   l. American Welding Society, AWS D4 Structural Welding Code – Reinforcing Steel.
   m. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
3. Where provisions of the above codes and standards are in conflict with each other or the building code in force for this project, the most stringent shall govern.

B. Allowable Tolerances:

1. Flatwork true to plane 1/8" in 10'- 0" in areas to receive vinyl composition tile or rubber flooring, and flatwork true to plane 1/4” in 10’- 0” elsewhere. 1/4” accumulated maximum.

C. Maintain copy of ACI 301 on site.

D. Testing:

1. Engage a testing agency acceptable to Architect to perform testing responsibilities of the Contractor as specified in ACI 301.

2. Contractor shall pay all costs of tests and transportation of test material.
3. Submit 7 day and 28 day compressive strength test results to the Architect for his review.
4. Test in accordance with Section 01 45 00 and "Methods of Sampling and Testing", ASTM C 94/C 94M.
5. Sample every 100 yards or fraction thereof for concrete poured in one day and submit 7-day and 28-day compressive strength test results to the Architect for his review.

E. Materials and installed work may require testing and retesting at any time during progress of Work. Tests, including retesting of rejected materials for installed work, shall be done at Contractor's expense.

F. Mockup: Cast mockup of size indicated or as required to demonstrate typical joints, form tie spacing, and proposed surface finish, texture, and color as requested by the Architect. Maintain sample panel exposed to view for duration of Project, after Architect's acceptance of visual qualities.
1. Demolish mockup and remove from Project site when directed by Architect.

G. Pre-installation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section 01 31 19 "Project Meetings" and the following:
1. At least 3 to 5 days prior to submitting design mixes, conduct a meeting to review detailed requirements for preparing concrete design mixes and to determine procedures for satisfactory concrete operations. Review requirements for submittals, status of coordinating work, and availability of materials. Establish preliminary work progress schedule and procedures for materials inspection, testing, and certifications. Require representatives of each entity directly concerned with cast-in-place concrete to attend conference, including, but not limited to, the following:
a. Contractor's superintendent.
b. Agency responsible for concrete design mixes.
c. Agency responsible for field quality control.
d. Ready-mix concrete producer.
e. Concrete subcontractor.
f. Primary admixture manufacturers.

H. Structural Design Data
1. Concrete:
a. Floor slab, walks, aprons, utility encasements and yard slabs: f'c=4000 PSI
b. Footings: f'c=3000 PSI
c. Piers, foundation walls: f'c=4000 PSI
d. Precast topping: f'c=4000 PSI
e. Parking lots: f'c=4500 PSI
f. All miscellaneous: f'c=4000 PSI

I. Concrete Mixes:

Min. Comp. Strength (PSI/28 days)	Max. Aggr. Size (in.)	Min. Cement (lbs/cu.yd.)
3000	1-1/2	493.5
4000	3/4	587.5
4000	3/4	540.5

Max. Wtr./ Cement Ratio	Max. Slump[1] (in.)	Air Content (percentage)
0.50	3	2-4
0.45	3	6[2]
0.45	3	2-4

[1]Indicates slump prior to addition of super plasticizers..
[2]Exterior concrete exposed to frost. Minimum air content 6% plus or minus 1 percent.

1. Minimum 28 day concrete cylinder strength shall be:
   a. Footings 3000 PSI
   b. Foundation Walls 4000 PSI
   c. Slab Systems 4000 PSI
2. Use ACI recommendations for slag cement substitute.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Cement: Store in weather-tight enclosures and protect against dampness, contamination, and warehouse set.

B. Aggregates:
   1. Stockpile to prevent excessive segregation, or contamination with other materials or other sizes of aggregates.
   2. Use only one supply source for each aggregate stockpile.

C. Admixtures:
   1. Store to prevent contamination, evaporation or damage.
   2. Protect liquid admixtures from freezing or harmful temperature ranges.
   3. Agitate emulsions prior to use.

1.05 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Allowable Concrete Temperatures:
      a. Cold weather: Maximum and minimum, ASTM C 94/C 94M.
      b. Hot weather: Maximum 90 degrees F. Do not place concrete during rain, sleet or snow unless protection is provided.
   2. Concrete work shall conform to American Concrete Institute, ACI 306R when the following conditions exist for more than three consecutive days:
      a. The average daily temperature is less than 40 degrees F (5 degrees C). The average daily temperature is the average of the highest and the lowest temperatures occurring during the period from midnight to midnight.
      b. The air temperature is not greater than 50 degrees F (10 degrees C) for more than one-half of any 24 hour period.
   3. Concrete work shall conform to American Concrete Institute, ACI 305R when any combination of the following conditions that tends to impair the quality of freshly mixed or hardened concrete by accelerating the rate of moisture loss and rate of cement hydration or otherwise cause detrimental results exists:

a. High ambient temperature (generally greater than 75 degrees F).
b. High concrete temperature
c. Low relative humidity
d. Wind speed
e. Solar radiation

4. Do not place concrete during rain, sleet or snow unless protection is provided.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Forms and Accessories:
1. See Section 03 10 00.

B. Reinforcement:
1. See Section 03 20 00.

C. Concrete:
1. Cement:
a. “Standard Specification for Portland Cement”, ASTM C 150.
2. Admixtures:
a. Air entraining:
i. “Standard Specification for Air-Entraining Admixtures for Concrete”, ASTM C 260.
b. Chemical Admixtures:
i. “Standard Specification for Chemical Admixtures for Concrete”, ASTM C 494/C 494M, Type A.
ii. Concrete may contain a Type A water-reducing admixture.
iii. Admixtures are to be used in accordance with manufacturer's recommendations.
iv. Chemical admixtures containing chlorides, sulfides, or nitrides are not permitted.
v. Admixtures shall be supplied by a single manufacturer.
vi. Admixture manufacturers are to be approved in writing by Architect/Engineer prior to use.
c. Do not use calcium chloride in concrete.
3. Aggregates:
a. “Standard Specification for Concrete Aggregates”, ASTM C 33.
4. Water: Clean and not detrimental to concrete.
5. Slump: Plus tolerance 0, minus tolerance 1-1/2".
6. Mix proportioning: To produce 7-day and 28-day compressive strength of moist cured laboratory samples, as specified under Structural Design Data.
7. Ready-Mixed Concrete:
a. “Standard Specification for Ready-Mixed Concrete”, ASTM C 94/C 94M.
8. Fly Ash:
a. “Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete”, ASTM C 618, Class C with a low sulfur content [Class F].
b. Quality shall be consistent and from the same source. Fly ash shall be Type C.
c. Fly ash shall be supplied by a single manufacturer.
d. Proportioning by weight of cement shall not exceed 15%.

i. For every 100 lbs. of cement, the mix shall be adjusted as follows:

(a.) 10 lbs. fly ash

(b.) 90 lbs. cement

e. Use of fly ash in exterior or entrained concrete on or after October 1 is not permitted.

D. Fiber Mesh:

1. Nylon fiber made of 100% virgin nylon 6 fiber for secondary reinforcement of concrete, ASTM C 39, ASTM C 78, and ASTM C 496. Acceptable products: Nycon nylon fiber as manufactured by Nycon, Inc., Nurlon Fiber Reinforcement as manufactured by Smith Chemical Corporation, and Forta Nylon as manufactured by FORTA Corporation.
2. Fiber Reinforcement: Polypropylene fibers engineered and designed for secondary reinforcement of concrete slabs, complying with ASTM C 1116, Type III, not less than 3/4 inch long.
3. Steel fibers per ASTM A 820.

E. Evaporation Reducer

1. MasterKure ER 50 as manufactured by BASF Chemical Company. Install per manufacturer's recommendations.

F. Concrete Curing Compound

1. “Standard Specification for Specification for Liquid Membrane-Forming Compounds for Curing Concrete”, ASTM C 309-11.
2. Curing and sealing materials shall be as follows:
   a. All cast-in-place concrete to shall be moisture cured in accordance with ACI 301-99.
   b. All exterior cast-in-place concrete shall receive “type 2” white pigment curing compound in accordance with ASTM C309-11.
3. No compound used shall inhibit or otherwise affect the application of the finish.

G. Concrete Joint Sealant

1. Joints to be sealed include control joints, construction joints, expansion joints, building isolation joints, bollard isolation joints, and isolation joints around floor cleanouts.
   a. Joint compounds shall be as follows:
      i. THC-901 as manufactured by Tremco, Inc., or Sonolastic SL 2 as manufactured by Sonneborn / ChemRex.
         (a.) All joints in concrete flatwork shall receive, unless otherwise stated, Tremco THC-901 or Sonolastic SL 2.
         (b.) Exterior concrete expansion joints in concrete walks and at bollards shall receive, unless otherwise stated, Tremflex 834 as manufactured by Tremco, Inc.
   b. All joints in concrete flatwork to receive floor finish in accordance with Division 9 will receive joint filler under Division 9.

H. Backer Systems

1. Horizontal joint backers
   a. Concrete Expansion and Isolation Joints where sealant is and is not specified:
      i. 1/4 inch thick: 1.7 PCF Polyethylene cross-linked closed cell foam with 1/2" deep tear-off strip used with either hot or cold sealants, Dyna Strip/Foamtastic Expansion Joint Material as manufactured by Symons Corporation.

I. Dovetail Anchor Inserts

1. Galvanized steel inserts with flexible dovetail furnished under Technical Specification

Section 04 05 23.

PART 3 - EXECUTION

3.01 INSPECTION

A. Assure that excavations and formwork are completed, and that ice and excess water are removed.

B. Check that reinforcement is secured in place.

C. Verify that expansion and isolation joint material, anchors and other embedded items are secured in position.

3.02 INSTALLATION

A. Preparation:

1. Notify other crafts involved in ample time to permit the installation of their work; cooperate with other trades in setting such work, as required.
2. Thoroughly wet form immediately before placing concrete, where form coatings are not used.
3. Coordinate the installation of joint materials, inserts, weepholes, embeds and bond breakers with placement of forms and reinforcing steel.
4. Provide mechanical equipment for conveying concrete, and runways for wheeled concrete conveying equipment as required.

B. Placing Concrete:

1. Place concrete in compliance with the practices and recommendations of ACI 304.
2. Convey concrete from mixer to final position by method which will prevent separation or loss of material.
3. Maximum amount of concrete free fall shall be four feet so that placement of concrete remains plastic and flows into position.
4. Deposit concrete in continuous operation until panel or section is completed.
5. Place concrete in horizontal layers of 18" maximum thickness.
6. Use air-entrained admixture 6% plus or minus 1% in exterior concrete exposed to weather.
7. Deposit and consolidate concrete slabs in a continuous operation, within the limits of construction joints, until the placing of a panel or section is complete. Checkerboard placement is not permitted. Concrete shall be placed in strips.
8. Delays in continuous concrete placements longer than 60 minutes create discontinuous concrete and will require replacement of the concrete. Alternately, written approval by the Architect/Engineer can waive the replacement requirement.

C. Joints

1. General: Construct joints true to line with faces perpendicular to surface plane.
2. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Architect/Engineer.
3. Contraction Joints in Slabs-on-Grade: Form weakened plane contraction joints, sectioning concrete into locations or areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
    a. Sawcut joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints into concrete when cutting action will no longer tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
    b. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals,

foundation walls, grade beams and other locations, as indicated.

D. Finishing

1. Formed Surfaces:

a. General:

i. Repairs and patches shall be done with compatible concrete grout.

ii. Repairs and patches are subject to approval of the Architect/Engineer. Repairs and patches deemed unacceptable by the Architect/Engineer shall be remedied at no cost to the Owner.

b. Rough-Formed Finish: As-cast concrete texture imparted by form facing material. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

i. Apply to concrete surfaces not exposed to view.

c. Smooth-Formed Finish: As-cast concrete texture imparted by form facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

i. Apply to concrete surfaces exposed to view.

d. Architectural Rubbed Finish: Apply the following finish to smooth-formed finish concrete scheduled to remain exposed to view:

i. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Unformed Surfaces:

a. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3. Floor Slabs:

a. General:

i. Comply with ACI 302.1R recommendations for spreading, vibrating, screeding, floating, re-straightening, troweling, and other finishing operations for concrete surfaces.

ii. Do not wet concrete surfaces during finishing operations.

b. Floating:

i. First Floating:

(a.) Apply first floating immediately after screeding and before any excess moisture or bleed water is present on the surface.

ii. Second Floating:

(a.) Do not work surface until surface is ready for the second floating. (typically after evaporation of most of the bleed water and the water sheen has disappeared.)

(b.) Compact and consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straighten until surface is left with a uniform, smooth, granular texture. Multiple passes shall be made perpendicular to previous passes.

iii. Apply float finish to surfaces to receive trowel finish.

c. Broom Finish: After floating and first troweling, and while still plastic, texture concrete surface. Scarify surface with a stiff-bristled broom in one direction.

i. Apply broom finish to exterior concrete platforms, stoops, steps, ramps, yard slabs, equipment pads, site concrete, garage floors, and elsewhere as indicated.

E. Hardening:

1. Harden concrete in accordance with manufacturer’s recommendations.

F. Curing and Sealing:

a. Keep concrete moist by using curing compounds in accordance with manufacturer’s recommendations and moisture cure in accordance with ACI 301.

b. Place concrete joint fillers and backer systems as specified herein and in accordance with manufacturer's recommendations.

G. Testing:

1. All concrete shall be tested in standard 6 x 12 inch cylinders.

2. Frequency of Testing:

a. Make at least one strength test for each 100 cubic yards, or fraction thereof, of each mixture design of concrete placed in any one day. When the total quantity of concrete with a given mixture design is less than 50 cubic yards, the strength tests may be waived by the Architect/Engineer if, in his judgment, adequate evidence of satisfactory strength is provided, such as strength test results for the same kind of concrete supplied on the same day and under comparable conditions to other work.

3.03 PROTECTION OF COMPLETED WORK

A. During curing period, protect concrete from damaging mechanical disturbances, water flow, loading, shock and vibration.

3.04 CLEANING

A. All cleaning shall comply with Technical Specification Section 01 74 00 of this Project Manual.

END OF SECTION

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SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following metal fabrications:

1. Rough hardware.
2. Steel Bollards

1.03 SUBMITTALS

A. General:

1. Comply with provisions of Section 01 33 00.

B. Shop drawings detailing fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other Sections.

C. Samples representative of materials and finished products as may be requested by Architect/Engineer.

1.04 QUALITY ASSURANCE

A. Fabricator Qualifications: Firm experienced in producing metal fabrications similar to those indicated for this Project with a record of successful in-service performance, and with sufficient production capacity to produce required units without delaying the Work.

B. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel," AWS D1.2 "Structural Welding Code--Aluminum," and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

1.05 PROJECT CONDITIONS

A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.01 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Steel Plates, Shapes, and Bars: ASTM A 36/ A 36M.

C. Rolled Steel Floor Plates: ASTM A 786/A 786M.

D. Steel Tubing: Product type (manufacturing method) and as follows:

1. Cold-Formed Steel Tubing: ASTM A 500.

2. Hot-Formed Steel Tubing: ASTM A 501.

E. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.

1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/ A 47M malleable iron or ASTM A 27/ A 27M cast steel. Provide bolts, washers, and shims as required, hot-dip galvanized per ASTM A 153/A 153M.

F. Welding Rods and Bare Electrodes: Select according to AWS specifications for the metal alloy to be welded.

2.02 FASTENERS

A. General: Provide plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for the type, grade, and class required.

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568, Property Class 4.6), with hex nuts, ASTM A 563/ A 563M, and, where indicated, flat washers.

C. Machine Screws: ANSI B18.6.3 (ANSI B18.6.7M).

D. Lag Bolts: ANSI B18.2.1 (ANSI B18.2.3.8M).

E. Wood Screws: Flat head, carbon steel, ANSI B18.6.1.

F. Plain Washers: Round, carbon steel, ANSI B18.22.1 (ANSI B18.22M).

G. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.

H. Anchor Bolts: ASTM F1554-99, Grade 36

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

1. Material: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as required.

K. Adhesive Anchors: Hilti HVA adhesive anchor with anchor meeting ASTM A193-01b, Grade B7.

1. Threads on anchors shall conform to Unified Standard Series of ASME B18.2.6 with Class 2A tolerances.

2.03 GROUT

A. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, non-corrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

B. Available Products: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, the following:

1. Non-shrink, Nonmetallic Grouts:

a. B-6 Construction Grout; Bonsal American, Inc.

b. Diamond-Crete Grout; Concrete Service Materials Co.

c. Sure-Grip High Performance Grout; Dayton Superior Specialty Chemical Corp.

d. Euco N-S Grout; Euclid Chemical Co.

e. Five Star Grout; Five Star Products, Inc.

f. Vibropruf #11; Lambert Corp.

g. Crystex; L & M Construction Chemicals, Inc.

h. Masterflow 928 and 713; ChemRex-Degussa Building Systems.

i. Sealtight 588 Grout; W. R. Meadows, Inc.

j. Sonogrout 14; Sonneborn Building Products, ChemRex-Degussa Building Systems

k. Kemset; ChemMasters.

2.04 CONCRETE FILL

A. Concrete Materials and Properties: Comply with requirements of Division 3 Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 PSI (20 MPa), unless higher strengths are indicated.

2.05 FABRICATION, GENERAL

A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.

C. Ease exposed edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Remove sharp or rough areas on exposed traffic surfaces.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

G. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

H. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

I. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

J. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

2.06 ROUGH HARDWARE

A. Furnish bent, or otherwise custom-fabricated, bolts, plates, anchors, hangers, dowels, and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.

B. Fabricate items to sizes, shapes, and dimensions required. Furnish malleable-iron washers for heads and nuts that bear on wood structural connections, and furnish steel washers elsewhere.

2.07 STEEL BOLLARDS

A. Fabricate pipe bollards from Schedule 40 steel pipe.

B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- (6.4-mm-) thick steel plate welded to bottom of sleeve.

2.08 FINISHES

A. General:

1. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to applying and designing finishes.

2. Finish metal fabrications after shop assembly.

B. Shop Finish

1. Surface Preparation:

a. SSPC-SP1: The Society for Protective Coatings “Surface Preparation Specification No. 1 – Solvent Cleaning” current Edition

2. Primer:

a. Fast curing, universal modified alkyd, rust inhibiting shop coat with good resistance to normal atmospheric corrosion compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure. Primer shall comply with all federal standards for VOC, lead, and chromate levels. Color shall be gray.

b. Shop prime immediately after surface preparation, applying according to manufacturer’s instructions to provide a dry film thickness of not less than 2.0 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surface.

3. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the hot-dip process complying with the following requirements:

a. ASTM A 153/A 153M for galvanizing hardware.

b. ASTM A 123/A 123M for galvanizing both fabricated and un-fabricated products made of uncoated rolled, pressed, and forged shapes, plates, bars, and strip 0.0299 inch (0.76 mm) thick or thicker.

C. Touch-Up Painting

1. Immediately after erection, clean field welds, bolted connections, and abraded areas of the shop paint and paint all exposed areas with the same material as used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

2. Galvanizing Repair Paint: High-zinc-dust-content paint for galvanizing welds and

repair-painting galvanized steel, with dry film containing not less than 90 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.

D. Finish Painting

1. Finish Painting shall be performed under Section 09 90 00 – Paints and Coatings.

PART 3 - EXECUTION

3.01 PREPARATION

A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, sleeves, anchor bolts, and miscellaneous items having integral anchors that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

B. Center nosings on tread widths with noses flush with riser faces and tread surfaces.

C. Set sleeves in concrete with tops flush with finish surface elevations. Protect sleeves from water and concrete entry.

3.02 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing miscellaneous metal fabrications. Set metal fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete masonry or similar construction.

D. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop-welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are intended for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

2. Obtain fusion without undercut or overlap.

3. Remove welding flux immediately.

4. At exposed connections, finish exposed welds and surfaces smooth and blended so that no roughness shows after finishing, and contour of welded surface matches those adjacent.

3.03 SETTING LOOSE PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.

B. Set loose leveling and bearing plates on wedges or other adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the bearing plate before packing with grout.

1. Use non-shrink, metallic grout in concealed locations where not exposed to moisture; use non-shrink, nonmetallic grout in exposed locations, unless otherwise indicated.

3.04 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a 2.0-mil (0.05-mm) minimum dry film thickness.

END OF SECTION

SECTION 07 11 00
DAMPPROOFING

PART 1 - GENERAL

At interior face of new salt shed foundation walls, from top of wall to 12” below finished grade, provide and install asphaltic damp proofing for protection of concrete from salt exposure.

1.01 SECTION INCLUDES

A. Surface preparation.

B. Application of a solvent type liquid applied asphaltic damp proofing membrane.

1.02 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

1.03 REFERENCES

A. Spray or Brush-on dampproofing coating

1. ASTM D4479-00 - Standard Specification for Asphalt Roof Coatings - Asbestos-Free.

1.04 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures.

B. Submit manufacturer's product data and application instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Store materials in a clean dry area in accordance with manufacturer's instructions.

C. Store at temperatures of 40oF (5oC) and above to facilitate handling.

D. Do not store at temperatures above 90oF (32oC) for extended periods.

E. Keep away from sparks and flames.

F. Protect materials during handling and application to prevent damage or contamination.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Product not intended for uses subject to abuse or permanent exposure to the elements.

B. Do not apply membrane when air or surface temperatures are below 35oF (2oC).

C. Do not apply to frozen concrete.

D. Do not apply when rain is imminent.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Basis of Design - W.R. Meadows, Inc., PO Box 338, Hampshire, Illinois 60140-0338. (800) 342-5976. (847) 683-4500. Fax (847) 683-4544. Web Site www.wrmeadows.com.

2.02 MATERIALS

A. Spray applied solvent dampproofing should be an asbestos-free, non-fibered asphalt compound that meets the U.S. EPA Architectural Coatings Rule requirements for VOC content.

1. Spray-Mastic by W.R. Meadows.

2. or approved equivalent

2.03 ACCESSORIES

A. Waterproofing Protection Course: Protection Course.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive membrane. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.02 SURFACE PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Concrete surfaces must be clean, smooth and free of standing water.

E. Patch all holes and voids and smooth out any surface misalignments.

3.03 APPLICATION

A. Apply dampproofing in accordance with manufacturer's instructions.

B. Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.

3.04 PROTECTION

A. Protect membrane on vertical and horizontal applications with immediate application of protection course.

B. Backfill within 24-48 hours using care to avoid damaging the dampproofing.

END OF SECTION

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SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. This Section describes all prefinished sheet metal flashing not specifically described in other Sections of these Specifications but required to prevent penetration of water through exterior shell of the building. Roof flashing details shall be compatible with roofing membrane manufacturer's specifications.

B. Related Work Described Elsewhere:

1. Division 7 Section 07 71 23 – Gutters and Downspouts
2. Division 7 Section 07 61 20 – Metal Roofing
3. Division 13 Section 13 34 23 – Salt Storage Structure

1.02 QUALITY ASSURANCE

A. Standards:

1. Comply with standards specified in this Section.
2. Comply with pertinent recommendations contained in current edition of "Architectural Sheet Metal Manual" published by the Sheet Metal and Air Conditioning Contractor's National Association.

B. Qualifications of Manufacturer:

1. Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect/Engineer.

C. Qualifications of Installers:

1. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

A. General:

1. Comply with provisions of Section 01 33 00.

B. Manufacturer's Data:

1. Within 15 calendar days after award of the Contract, submit:
    a. Complete materials list of all items proposed to be furnished and installed under this Section.
    b. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.
    c. Shop Drawings showing all proposed work of this Section.
    d. Manufacturer's recommended installation procedure.
    e. The manufacturer's recommended installation procedures, when approved by the Architect/Engineer, will become the basis for inspecting and accepting or rejecting actual installation procedures used on this work.

1.04 PRODUCT HANDLING

A. Protection:

1. Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

B. Replacements:

1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 EXPOSED SHEET METAL & FLASHINGS

A. ASTM A 5653/A 653M, lock-forming quality.

B. Aluminum with 1 mil Kynar 500 finish with ten (10) year guarantee.

C. Minimum 24 gauge.

D. Manufactured units are subject to Architect's approval.

E. Typical drive cleat connection every 10 feet for water tightness and expansions.

F. Color to be selected by Architect.

G. Clips:

1. Minimum width 2".
2. Same material and thickness as sheet metal.

2.02 FASTENERS

A. Nails: Galvanized steel material, flathead, wire, barbed, slated type, FS FF-N-105 B(2).

B. Screws: Cadmium Plated material, self-tapping sheet metal type, FS-S-107 C(1).

C. Rivets: Cadmium plated material, type and size recommended sheet metal manufacturer.

D. Bolts: Cadmium plated material, hex head, FS FF-B-575 C.

E. Nuts: Cadmium plated material, hex head, FS FF-N-836 D.

F. Washers: Neoprene, type and size recommended to fit anchor.

2.03 EXPANSION ANCHORS

A. FS FF-B-588 C.

2.04 SOLDER

A. ASTM B 32; Alloy grade 58, 50% tin, 50% lead.

2.05 SEALANT

A. FS TT-S-00227 E (3), Type II, Class A.

2.06 BITUMINOUS PLASTIC CEMENT

A. FS SS-C-153 B, Type I.

2.07 PRIMER COATING

A. FS TT-P-641 G, Type II.

2.08 ASPHALTIC COATING COMPOUND

A. FS TT-C-494, Type II.

2.09 REGLETS

A. Same material and thickness as sheet metal.

B. Shop formed corners and joint connectors.

C. Provide Fry Springlok Flashing System: Type SM (Expan-O-Seal).

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that substrates are smooth and clean to extent needed for sheet metal work.

B. Verify that reglets, nails, cants and blocking to receive sheet metal are installed and free of concrete, mortar, grout and soil.

C. Do not start sheet metal work until conditions are satisfactory.

3.02 PREPARATION

A. Before installing sheet metal, verify shapes and dimensions of surface to be covered.

3.03 INSTALLATION

A. General:

1. Install work water-tight, without waves, warps, buckles, fastening stresses or distortion, allowing for expansion and contraction.
2. Hem exposed edges.
3. Angle bottom edges of exposed vertical surfaces to form drips.
4. Install flashing and sheet metal to comply with Sheet Metal and Air Conditioning Contractors' National Association, Inc.

3.04 CLIPS

A. Spaced Clips:

1. 2' on-center.
2. Secure to substrate with fasteners and cover heads with clip tabs.

B. Concealed mechanical fasteners to be 0.063" thick aluminum.

3.05 SOLDERING

A. Clean and flux metals prior to soldering.

B. Sweat solder completely through seam width.

3.06 SEALANT INSTALLATION

A. Apply 1/4" diameter bead, centered on full length of butt joints under drive cleat connections.

B. Apply continuous 1/4" bead under hem edges of sheet metal.

C. Apply continuous 1/4" bead along top of reglets.

3.07 BITUMINOUS PLASTIC CEMENT

A. Trowel 1/8" thick.

3.08 ROOF COUNTERFLASHING

A. Overlap base flashing 4" minimum.

B. Install bottom edge tight against base flashing.

C. Lap seam vertical joints 3" minimum, and apply sealant.

D. Miter, lap seam, and close corner joints with solder or sealant.

3.09 ROOF PENETRATION FLASHING

A. Base Flashing:

1. Extend flange onto roof 6" minimum away from penetration.

2. Extend flange upward around penetration to at least 12" above roofing.
3. Fold back upper and side roof flange edges 1/2" minimum.
4. Solder-lap joints.

B. Counter-flashing:
1. Overlap base flashing 1" minimum with storm collar sloped away from penetration.
2. Secure to penetration with solder.

3.10 SHEET METAL COPING

A. Form metal coping to dimensions shown on the Drawings.

B. Fabricate joints with lap seams spaced no greater than 10' apart and install drive cleat connection and lap seams in bed of sealant.

C. Install non-corrosive #14 screw and neoprene washer assembly on roof side of coping.

D. Lock drip edge over clips secured to substrate.

E. Miter corners and locate lap seams 5'- 0" in each direction.

3.11 MASONRY FLASHING

A. Furnish to masonry contractor for installation.

3.12 REPAIRING

A. Repair or replace damaged work.

3.13 CLEANING

A. As work progresses, neutralize excess flux with 5 to 10% washing soda solution, and thoroughly rinse.

B. Leave work clean and free of stains, scrap and debris.

END OF SECTION

SECTION 07 61 20
METAL ROOFING

PART 1 - GENERAL

1.01 RELATED WORK ELSEWHERE

A. Section 07 71 23: Gutters and Downspouts

1.02 DESCRIPTION

A. Applicable portions and requirements of Division 1, reference drawings apply to work in this Section.

B. Work under this section includes furnishing and installing all materials and labor required for the new roof system. This Includes but is not limited to the following: roof panels, clips, closures, flashing, underlayment, snow guards, sealants, and other items required for a complete metal roof system.

1.03 GENERAL

A. Perform work and fabricate steel in accordance with specifications for the design, fabrication and erection of structural steel for buildings of AISC, State Code and specified herein. Steel to remain exposed shall also comply with specification for architecturally exposed structural steel of AISC.

1.04 QUALITY ASSURANCE

A. Codes and Standards:
   1. All work shall conform to the requirements of the State of Illinois and Wisconsin Code.
   2. All work shall conform to the requirements of the following codes and standards:
      a. American Institute of Steel Construction (AISC).
      b. American Society for Testing and Materials (ASTM).
   3. Where provisions of pertinent codes and standards conflict with this specification, the more stringent provisions shall govern.
   4. Design criteria shall be for a live load of thirty (30) pounds per square foot of horizontal projection of roof area and a twenty (20) pound per square foot wind load.

B. Performance Criteria:
   1. Provide wind uplift resistance in accordance with the 1994 Uniform Building Code and pertinent local and state codes.
   2. Provide a design analysis signed by a registered Professional Engineer, confirming that the structural capacity of the metal roofing system as determined in accordance with ASTM E 1592 is adequate to resist the above design loads in accordance with the 1994 UBC. Analysis should include calculations verifying the design loads, the uplift pressures and how those loads affect the various areas of the roof. Provide a roof plan with the perimeter areas of discontinuity clearly shown and distinguished from the typical field roof elements.
   3. Provide pull out test for implementation of existing building systems and components in determining fastener type and frequency to be used with existing construction.

1.05 WARRANTY

A. Manufacturer's Product Warranty:
   1. Warrant for 20 years, following project delivery date, that panels will be free from defects, and that panels if properly installed will not rupture, fail structurally or perforate.

B. Installers Warranty:

1. Warrant panels, flashing, sealants, fasteners, and accessories against defective workmanship, and to remain watertight and weatherproof with normal usage for two (2) years.

1.06 SUBMITTALS

A. Shop Drawings:

1. Within 30 days after award of Contract, and before any of the materials of this Section are delivered to the job site, submit complete shop drawings to the Architect in accordance with the provisions of Section 01.300 of these specifications; show erection plans, connection details including location, type and size of all rivets, bolts and welds. Weld symbols shall conform to AWS A2.4-79 "Symbols for Welding and Nondestructive Testing".

1.07 PRODUCT HANDLING

A. Protection:

1. Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the installed work and materials of all other trades.

B. Replacement:

1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

C. Storage:

1. Materials shall be stored in a weathertight and dry place until ready for use in the work.

PART 2 - PRODUCTS

2.01 MATERIALS, FABRICATION & ASSEMBLY

A. Roofing System

1. Metal Roof: Fabricate roof face sheets to the profile or configuration indicated from 26 gauge, Grade D, pre-finished steel sheets.
    a. Pitched Metal Roof: Manufacturer’s standard factory-formed roof panel system designed for concealed clip attachment of panels to wood deck using a concealed clip and clip bearing plates. Acceptable Product and Manufacturer: 26 gauge Coated Metals Group (CMG) ultra-snap pre-formed standing seam roofing panels 1 3/4” high seams at 16” nominal centers, continuously from eave or valley to hip or ridge (having no end laps or transverse seams). CMG pre-finished steel with full strength finish in manufacturer’s standard color.
        i. Color to be: CMG Ash Gray.
        ii. Clips: Provide 16 gage panel clips.
        iii. Cleats: Factory caulked, mechanically seamed cleats formed from 24 gauge, Grade D.
        iv. Fasteners: Screws, bolts, nuts, self-locking rivets, self-locking bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. System shall have a UL 90 uplift rating. Color match at exposed locations.
    b. Use aluminum or stainless steel fasteners for exterior applications.
2. Accessories: Provide the following sheet metal accessories factory-formed of the same material in the same finish as roof panels:
    a. Flashings
    b. Closers

c. Fillers

d. Fascias

3. Provide manufacturer's standard Ridge cover.

4. Flexible Closure Strips: Closed-cell, expanded cellular rubber, and self-extinguishing flexible closure strips. Cut or pre-mold to match configuration of roofing and siding sheets. Provide closure strips where indicated or necessary to ensure weathertight construction.

5. Sealing Tape: Pressure-sensitive 100 percent solids grey polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

6. Joint Sealant: One-part elastomeric polyurethane, polysulfide, or silicone rubber sealant as recommended by the building manufacturer.

B. Performance Requirements:

1. The standing seam roof panels shall be installed to limit air infiltration and water penetration to the values given below. Panels shall have been tested for air infiltration and water penetration by a qualified independent testing laboratory and copies of successful test results shall be submitted to the Architect-Engineer.

a. Air Infiltration: When tested in accordance with NAAM Test Procedure TM-1-68T, there shall be gross air leakage no greater than .021 cfm per square foot of overall face area at a static pressure differential of 20 psf.

b. Water Penetration: When tested in accordance with NAAM Test Procedure TM-1-68T with water sprayed at the rate of 5 gallons per hour per square foot of overall face area at a static pressure of 3.9 psf for 15 minutes, there shall be no uncontrollable water penetration.

2. Panel Finish

a. The Panel Finish:

i. CMG ash gray color or equivalent.

3. Panel Application

a. All side laps will be field sealed by a lock-seaming device.

b. All sidelap sealant shall be factory applied.

c. Panel laps shall be at least 6" sealed with sealants and fastened together by clamping plates.

4. Fasteners

a. All connections of panels to structural members shall be made with clips with movable tabs that are seamed into the standing lock seam sidelap.

b. Connections shall be made with positive field formed standing double lock seam.

c. Standing seams shall be formed by a special lock seaming device.

d. Fastener locations shall be as shown on erection drawings as furnished by manufacturer.

5. U. L. Uplift Ratings

a. Roof system on wide-span structural, with 24-gauge minimum thickness steel panels (all coatings) carries a U.L. wind-uplift class 90 rating U.L. Construction No. 62A.

6. Accessories and trim shall be as standard with manufacturer unless otherwise noted and furnished as specified. Location of standard accessories shall be as shown on erection drawings as furnished by manufacturer.

C. Guarantee

1. The contractor shall furnish a guarantee for the roofing system and its components against defective materials and workmanship for a period of five (5) years.

2.02 ROOF UNDERLAYMENT

A. Roof in underlayment material for installation on roof sheathing at standing seam metal roofing shall be as follows:

1. Underlayment:

a. FT Synthetics Platinum HT-SA high temperature ice and water shield, self adhering underlayment, or equivalent.

2.03 SNOW GUARDS

A. Install (2) rows on each side, Sno-Safe S-5 snow guards clamped to standing seams, with snow clip accessories, or, Icejax II snow guards as manufactured by Snoblox™ as indicated on drawings.

2.04 NAILS

A. Hot galvanized, 11 gauge-barbed shank, 3/8" head, and 1" minimum length, Staples are not permitted.

2.05 BITUMINOUS PLASTIC CEMENT

A. FS SS-C-153C, Type I.

PART 3 - EXECUTION

3.01 TOLERANCES

A. Rolling, fabricating and erection tolerances shall conform to the requirements of AISC "Code of Standard Practice for Steel Building and Bridges".

3.02 INSPECTION

A. Assure that surfaces to which the standing seam metal roof panels and accessories are to be applied are uniform, smooth, sound, clean, dry and free of irregularities.

B. Verify that installation of ice and water shield, metal flashings, and metal trim has been completed.

C. Verify that work of other trades which penetrates roof deck has been completed.

D. Do not start work until unsatisfactory conditions are corrected.

3.03 APPLICATION

A. Felt Underlayment:

a. Lay one layer of underlayment horizontally over entire roof, lapping each course over lower course one half course and 4" side lap.

b. Lap underlayment 6" from both sides over hips and ridges.

c. Secure underlayment to deck with sufficient fasteners to hold in place until roofing is applied.

B. Flashings:

1. Eaves Flashing:

a. Install to metal drip edge and where indicated a gutter apron to overhang underlayment.

b. Apply one row of 3'-0" wide ice and water shield at the eave.

c. Nail 1" in from each edge to hold ice and water shield in place.

d. Splice by overlapping ends of upper segments of ice and water shield 12" over lower segments, and secure with bituminous plastic cement.

3.04 INSTALLATION

A. Responsibility for Installation: The metal panel roofing manufacturer shall be fully responsible for the installation of all work specified in this section. Installation shall be

performed by trained mechanics of the manufacturer or by a duly authorized agent of the manufacturer approved by the Architect-Engineer. No installation of the metal roof panel shall commence until written approval of the installation sub-contractor has been received from the Architect-Engineer.

B. General: All sheets, shall be formed to provide interlocking, weatherproof joints, adequately reinforced, and provided with metal bulkheads at ends of the insulated panel units to protect the insulation.

1. Panel lengths shall be as shown on drawings, or as long as practical. Horizontal joints shall be made only at structural members or at similar points. All panels cut to a slope, or otherwise, shall have the ends or edges protected by suitable metal fittings securely fastened to panel sheets.
2. Panels shall be rigidly attached to the structure with bolts, clips, self-tapping screws, or other methods approved by the Architect-Engineer. Welding of metal fittings securely fastened to panel sheets.
3. All fasteners for exterior panels shall be concealed type. No exposed fasteners will be permitted.
4. Provide and install all angles and other steel members not designated as structural steel or miscellaneous metal work, but which are required for a complete and rigid panel installation.
5. Furnish and install all stainless steel or cadmium plated screws or studs and concealed clips required to fasten panels to structure and various parts of the panels together.

C. Joint Sealing and Locking: Seal all interlocking joints of interior sheets and of exterior sheets with sealed compound applied, whenever possible, in the shop to a sufficient depth to insure sealed joints. Apply sealer carefully and remove excess sealer from exposed surfaces after erection. Clinch-lock the inter-locking ribs of sheet with a button punch or similar device at intervals not to exceed 4'-0".

D. Sheet Metal Flashing and Fittings:

1. Metal panel work shall include certain sheet metal flashing as specified, also other sheet metal fittings as required for a complete job.
2. Install all sheet metal flashing related to or in conjunction with metal panel siding according to flashing details shown on the drawings.
3. Install flashings at all wall/roof intersections. Where flashing is related to metal panel siding and is adjacent to or is part of the expansion joints, the top sheet of expansion joint shall be of the same material as the exterior face sheet of the metal panel roofing and shall be provided and installed by the Metal Panel Roofing Contractor.
4. The lower edges of exposed fascia and flashings, caps, etc., shall be held down with compatible metal cleats or clips. Exposed edges of all sheet metal shall be folded back at least 1/4" to form a hemmed edge.
5. Furnish and install neoprene or EPDM gaskets to close open ends of panels. Gaskets shall be the same shape as the panel sheets and make a weathertight closure. Provide weathertight closures around all items such as pipes, ducts, brackets, etc., which pass through the metal panel siding.
6. All field caulking required for a weathertight wall panel installation shall be done with an approved, non-hardening elastic sealant.

3.05 PAINTING

A. All plain steel accessory items and fittings shall be prime painted on all surfaces and edges with one shop coat of light colored metal primer.

3.06 ADJUST AND CLEAN

A. Replace damaged panels and accessories.

B. Remove excess panels and accessories not part of extra stock and debris from project site.

C. Seal flashings to roof penetrations.

3.07 CLEANING AND CLEAN-UP

A. After erection, all exposed surfaces of metal panel roofing installations, including interior and exterior shall be cleaned and left free of all grime and dirt.

B. Cleaning and Repairing: At completion of each day's work and at work completion, sweep panels and flashing clean. Do not allow fasteners, cuttings, filings or scraps to accumulate on finish surfaces.

C. The Metal Panel Roofing Contractor shall be responsible for the cleanup and removal of all excess metal panels and shipping cartons wrapping, etc.

END OF SECTION

SECTION 07 71 23
GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.01 RELATED WORK ELSEWHERE

A. Division 13 34 23 – Salt Storage Structure

1.02 DESCRIPTION

A. Work includes furnishing and installing of closures, gutters, downspouts, flashing, trim, fasteners, and all other accessories as needed for a complete installation.

1.03 SUBMITTALS

A. General:
   1. Comply with provisions of Section 01 33 00.

B. Samples:
   1. Two pieces, minimum one lineal foot of prefinished aluminum gutter and downspout showing representative pattern and textures; color samples showing manufacturer's full range.

C. Manufacturer's Literature: Material descriptions and recommended installation procedures.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver materials with manufacturer's labels intact and legible.

B. Deliver materials in sealed packages with Underwriter's Laboratories Inc. labels.

C. Store materials on raised platforms and protect with coverings at outdoor locations.

1.05 GUARANTEE

A. Materials: Guarantee against defects for 20 years.

B. Workmanship: Guarantee against defects for 2 years.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Peterson or Pac Clad Aluminum .040 pre-finished aluminum, nails, and pop rivets. Field measured and shop fabricated.

B. Gutters and Downspouts
   1. Gutter system with accessories equivalent to profile Pac Clad box gutter, .040, manufactured of aluminum with expansion joints at 40'- 0" intervals. .125 painted support brackets @ 30" O.C. and universal gutter straps.
   2. 6" Downspout system with face closure shall be the size shown on the Drawings and constructed of .040 material. Surfaces to remain exposed to view shall have color and finish to match gutter. Hangers at 48" O.C. and

C. Provide all necessary flashing and trim, corner and edge trim of matching color and gauge for a complete and weather-tight installation.

D. Sealant
   1. Provide all necessary sealant of matching color of gutters for a complete and weather-tight installation.

E. Other Materials

1. All other materials not specifically described but required for complete and proper gutter and downspout installation, shall be first quality of their respective kinds, new, and as selected by the Contractor subject to the approval of the Architect.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Assure that surfaces to which material are to be applied are uniform, smooth, sound, clean, dry and free of irregularities.

B. Verify that installation of substrate has been completed.

C. Verify that work of other trades which penetrates the overhang and walls is completed.

D. Do not start work until unsatisfactory conditions are corrected.

E. Install gutters, downspouts, guards and accessories true and plumb. Slope gutters to the appropriate downspout shown on the Drawings.

3.02 ADJUST AND CLEAN

A. Replace damaged gutters, downspouts, and accessories.

END OF SECTION

SECTION 07 92 00
JOINT SEALANTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. This Section describes sealing of all joints where shown on the Drawings and elsewhere as required to provide a positive barrier against passage of air and passage of moisture.

1.02 QUALITY ASSURANCE

A. Standards:

1. Comply with standards specified in this Section.

B. Qualifications of Manufacturers:

1. Products used in the work of this Section shall be produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect/Engineer.

C. Qualifications of Installers:

1. Proper caulking and proper installation of sealants require that installers be thoroughly trained and experienced in the necessary skills and thoroughly familiar with the specified requirements.

D. For caulking and installation of sealants throughout the Work, use only personnel who have been specifically trained in such procedures and who are completely familiar with the joint details shown on the Drawings and the installation requirements called for in this Section.

1.03 SUBMITTALS:

A. General:

1. Comply with provisions of Section 01 33 00.

B. Manufacturer's Data: Within 15 calendar days after Award of the Contract, submit:

1. A complete materials list showing all items proposed to be furnished and installed under this Section.
2. Sufficient data to demonstrate that all such materials meet or exceed the specified requirements.
3. Specifications, installation instructions, and general recommendations from the materials manufacturers showing procedures under which it is proposed that the materials will be installed.
    a. Upon approval by the Architect, the proposed installation procedures will become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

C. Prior to acceptance of Work, furnish written guarantee for five (5) years covering repairs required to maintain caulking in a weather-tight condition. Make repairs at no expense to Owner.

1.04 PRODUCT HANDLING

A. Delivery and Storage:

1. Deliver all materials of this Section to the Project site in the original unopened containers with all labels intact and legible at time of use. Store only under conditions recommended by the manufacturers. Do not retain on the Project site any material which as exceeded the shelf life recommended by its manufacturer.

B. Protection:

1. Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 SEALANTS

A. Sealant material shall be a one part polyurethane sealant exceeding the requirements of Federal Specification TT-S-00230.

B. Sealant Manufacturers and Products:

1. Sonneborn Building Products “Sonolastic NP1”
2. Sika Corp. ”Sikaflex 180”
3. Tremco, Inc. “Dymeric 511”

C. Sealant shall be applied on the exterior of the building between exterior door, sidelight, window and louver frames and masonry and concrete; at exterior expansion and control joints in masonry; under thresholds; and other areas where nature of work required it for appearance or to ensure tight construction.

D. Prime surfaces in accordance with manufacturer's recommendations prior to applying sealant.

E. Follow manufacturer's recommendation on maximum width and depth of beads, generally maximum width of bead not-to-exceed two times the depth, minimum depth 1/4".

F. Fill joints deeper than 1/2" with polyurethane foam spacers.

G. Sealant shall be applied on the interior of the building between all doors, sidelight, window and louver frames and masonry, drywall, and concrete; at interior expansion and control joints in masonry; under thresholds, between cabinetry and walls; and other areas where nature of work requires it for appearance or to ensure tight construction.

H. Sealant shall be at least 1/2" deep; fill joints deeper than 1" with non-impregnated filler before caulking. Prime block and other porous surfaces prior to caulking as per manufacturer’s specifications.

I. Sealant behind removable flanges, beads or drops when possible, removing items or doing work in advance for this purpose.

2.02 COLORS

A. Colors for each sealant will be selected by the Architect/Engineer from standard colors normally available from the specified manufacturers. Should such standard color not be available from the approved manufacturer except at additional charge, provide all such colors at no additional cost to the Owner.

B. In concealed installations and in partially or fully exposed installations where so approved by the Architect/Engineer, standard gray or black sealant may be used.

2.03 PRIMERS

A. Use only those primers which are non-staining, have been tested for durability on the surfaces to be sealed, and are specifically recommended for this installation by the manufacturer of the sealant used.

2.04 BACKUP MATERIALS

A. General: Use only those backup materials which are specifically recommended for this installation by the manufacturer of the sealant used, and which are non-absorbent and non-staining.

2.05 BOND-PREVENTIVE MATERIALS

A. Use only bond-preventive materials best suited for the application and as recommended by the manufacturer of the sealant used.

2.06 MASKING TAPE

A. For masking around joints, provide masking tape conforming to Federal Specification -UU-T-106c.

2.07 OTHER MATERIALS

A. All other materials, not specifically described but required for complete and proper caulking and installation of sealants, shall be first quality of their respective kinds, new, and as selected the Contractor subject to the approval of the Architect/Engineer.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Follow the manufacturer’s recommended method of preparation for each type of material to which sealant to be applied.

3.03 INSTALLATION OF BACKUP MATERIAL

A. Use only the backup material recommended by the manufacturer of the sealant and approved by the Architect/Engineer for the particular installation, compressing the backup material 25% to 50% to secure a positive and secure fit. When using backup of tube or rod stock, avoid lengthwise stretching of the material. Do not twist or braid hose or rod backup stock. Open cell backer rod is not permitted.

3.04 PRIMING

A. Use only the primer recommended by the manufacturer of the sealant and approved by the Architect/Engineer for the particular installation. Apply the primer in strict accordance with the manufacturer's recommendations as approved by the Architect/Engineer.

3.05 BOND-BREAKER INSTALLATION

A. Install an approved bond-breaker where recommended by the manufacturer of the sealant and where directed by the Architect/Engineer, adhering strictly to the installation recommendations as approved by the Architect/Engineer.

3.06 INSTALLATION OF SEALANTS

A. General:

1. Prior to start of installation in each joint, verify the joint type according to the details in the Drawings, and verify that the required proportion of width of joint to depth of joint has been secured.

B. Equipment:

1. Apply sealant under pressure with hand or power-actuated gun or other appropriate means. Guns shall have nozzle of proper size and shall provide sufficient pressure to completely fill joints as designed.

C. Masking:

1. Thoroughly and completely mask all joints where the appearance of sealant on adjacent surfaces would be objectionable.

D. Installation of Sealant:

1. Install the sealant in strict accordance with the manufacturer's recommendations as approved by the Architect/Engineer, thoroughly filling all joints to the recommended depth.

E. Tooling:

1. Tool all joints.

F. Cleaning Up:

1. Remove masking tape immediately after joints have been tooled.
2. Clean adjacent surfaces free from sealant as the installation progresses. Use solvent or cleaning agent as recommended by the sealant manufacturer.

END OF SECTION

SECTION 08 22 00
FIBERGLASS DOORS AND FRAMES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. This Section describes all standard and non-standard fiberglass doors and fiberglass door frames delivered to the Project.

1.02 QUALITY ASSURANCE

A. General: Provide fiberglass reinforced door and frame units made of components of standard construction furnished by one manufacturer as coordinated assemblies.

B. Manufacturer: Company specializing in the manufacture of fiberglass doors and frames with a minimum of five years documented experience.

C. Construction: Verify that FRP doors and frames are manufactured utilizing pultruded fiberglass components for flexibility, durability, superior strength and chemical resistance. Press-molded doors and frames will not be accepted. Resin rich door edges and gelcoat are prone to chipping and cracking (brittle).

D. Resins: Resins shall comply with USDA and FDA standards for incidental food contact.

E. Flame Spread Rating: Flame retardant structural shapes meet the minimum flame spread rating less than or equal to 25 when tested according to ASTM E84.

F. Fire-rated doors and frames to conform to NFPA 252 (2008), CAN4 S104 (1985), UL10C (2001), and UL9 (2005).

G. Impact Strength: FRP doors and panels 10.32 foot-pounds per inch of notch, ASTM D-256.

H. Tensile Strength:

1. FRP doors and panels 12,000 psi, ASTM D-638.
2. FRP frames 30,000 psi, ASTM D-638.

I. Flexural Strength: FRP doors, panels, and frames 25,000 psi, ASTM D-790.

J. Compressive Strength:

1. FRP doors and panels 18,000 psi, ASTM D-695.
2. FRP frames 30,000 psi, ASTM D-695.

K. Water Absorption: FRP doors, panels, and frames .27 %, ASTM D-570.

L. Hardware Reinforcements: FRP doors and frames fabricated with a minimum screw holding strength of 1,000 lbs. Tested with a #12 x 1-1/4" hinge screw.

M. Paint Adhesion: Coating for FRP doors, panels, and frames to conform to AAMA 624-07 for color uniformity, film adhesion, specular gloss, direct impact, abrasion resistance, and chemical resistance.

N. Warranty: Warranty fiberglass doors and frames for life of the initial installation against failure due to corrosion. Additionally, warranty fiberglass doors and frames for a period of 10 years against failure due to materials and workmanship, from date of substantial completion

1.03 SUBMITTALS

A. General:

1. Comply with provisions of Section 01 33 00.

B. Manufacturer's Data:

1. Within 15 calendar days after Award of Contract, submit:
    a. Complete materials list of all items proposed to be furnished and installed under this Section.
    b. Manufacturer’s specifications and other data required to demonstrate compliance with the specified requirements.
    c. Shop drawings showing details of each frame type, elevations of each door design type, details of all openings, and all details of construction, installation, and anchorage.

C. The manufacturer's recommended installation procedures, when approved by the Architect, will become the basis for inspecting or rejecting actual installation procedures used on the Work.

1.04 PRODUCT HANDLING

A. Protection:
    1. Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

B. Replacements:
    1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.

1.05 WARRANTY

A. Warranty all fiberglass doors and frames for a period of 25 years against failure due to corrosion. Additionally, warranty all fiberglass doors and frames on materials and workmanship for a period of 10 years, including warp, separation or delamination, and expansion of the core.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Edgewater FRP Door - 175 N. Western Ave. Neenah, Wisconsin 54956 Phone: 920-886-1995 Fax: 920-886-1998, Or approved equal.

B. Simon Door, Division of FRP Lite - P.O. Box 4557, Brownsville Texas 78523, (866) 894-7511.

2.02 FRP DOORS

A. Products listed based on Edgewater FRP Doors.

B. Exterior Doors and High Traffic Areas: Provide doors complying with requirements indicated below:
    1. E-S series from the "Cutting Edge" product line (seamless).
    2. Doors to have full height heavy duty vertical fiberglass stiffeners 6 inches on center for superior strength.
    3. Expanded polystyrene solid foam core.

C. Vision Lite Systems: Lite opening shall be completely sealed utilizing fiberglass pultrusions, integrated into the units sub-frame during construction.

2.03 FRAMES

A. General: Provide pultruded fiberglass frames for doors, transoms, sidelites and borrowed lites - where indicated.

B. Frames: Comply with the requirements of grade specified for corresponding doors. Frames for E-S (standard), E-P (premier), and E-C (custom) series fiberglass doors to be manufactured from 0.1875 inch (4.8 mm) thick fiberglass pultrusions. Profile must be of

standard hollow type to permit installation into new concrete or block walls, as well as slip-on drywall situations. Solid (foam filled) or boxed frames will not be accepted.

C. Fire-rated Frames: Frames for E-F (fire) series fiberglass doors to be manufactured from 0.1875 inch (4.8 mm) thick fiberglass pultrusions. Profile must be of standard hollow type to permit installation into new concrete or block walls. *Coated hollow metal frames will not be accepted.*

D. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

E. Plaster Guards: Provide plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation. Supports and Anchors: Fabricated from no less than 0.125 inch (3.18 mm) thick pultruded fiberglass material.

1. Wall Anchors in New Masonry Construction: Provide T-strap or wire anchors.
2. Wall Anchors in Existing Masonry Construction: Provide six (three per jamb) Redhead or Lock-bolt type flat head, stainless steel expanding sleeve bolts, 3/8 inch diameter, 4 inches in length.
3. Wall Anchors in New Steel or Wood Stud Construction: Provide multi-purpose type fiberglass anchor supports in backside of frames for attachment from the stud wall into the frames anchor supports. This installation must take place prior to setting drywall.
4. Existing Steel or Wood Stud: Provide drywall slip-on frame anchoring system - compression type.

2.04 FABRICATION

A. General: Fabricate fiberglass door and frame units to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Core Construction: Manufacturer's standard core construction that complies with the following:

1. E-S (standard) series to have expanded polystyrene foam core.

C. Stiles and Rails: Fabricate doors utilizing heavy duty pultruded fiberglass tubular members.

D. Door Faces: Laminated composite faces shall be urethane fused to the stile and rail assembly, including the vertical stiffeners and core material, utilizing a two-part 100 percent reactive urethane adhesive, and then cured under pressure until completely bonded.

E. Clearances: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch (19 mm) at bottom, with standard being 5/8 inch (15.9 mm) at bottom.

F. Door Edges: Lock stile to be factory beveled 1/8" in 2" for rub-free operation. Square lock-edge will not be accepted.

G. Tolerances: Maximum diagonal distortion - 1/16 inch (1.6 mm) measured with straight edge, corner-to-corner.

H. Hardware Reinforcement: Fabricate all hardware reinforcements utilizing premium high density polyethylene (HDPE) and fiberglass blocking. Any form of wood or metal reinforcements will not be accepted.

I. Exposed Fasteners: Unless otherwise indicated, provide stainless steel, countersunk flat or oval heads for exposed screws and bolts.

J. Thermal-Rated (insulating) Assemblies: At exterior locations and elsewhere shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies, with an "R" value of 11-12.

K. Door Hardware to be as shown on drawings.

L. Frame Construction: Fabricate frames to size and shape shown on drawings.

1. Fabricate frames with mitered resin-welded corners and seamless face joints.
2. Provide set-up and resin welded frames with temporary spreader bars.
3. Provide 4 or 6 inch terminated/hospital stops - where indicated.

M. Hardware Locations: Locate hardware as indicated on shop drawings or if not indicated, according to manufacturer's standard locations.

N. Glazing/Louver Stops: Manufacturer's standard two-piece PVC retainers.

1. Provide non-removable stops on outside of exterior and on secure side of interior doors for glass, louver, and other panels in doors.
2. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.
3. Loose, eight piece trim kits will not be accepted. Additionally, retainers held in place by two-sided tape are not acceptable.
4. Glass to be 1" insulated: ¼" inside, ½" air gap, ¼" outside, clear.

O. Astragals: Fabricate astragals for pairs of doors utilizing fiberglass materials in either flat or "T" configuration - where indicated.

2.05 FINISHES

A. Factory Finish: Pre-clean, shop prime and finish paint each door and frame. Factory finish doors for on-site delivery with Manufacturers standard chemical resistant waterborne acrylic enamel topcoat.

1. Furnish fiberglass doors and frames factory pre-finished.
2. Sheen: semi-gloss

B. Door Faces: Face skins shall be smooth. Due to the unit's extra-long life expectancy, minor repairs on facings must be easily blended in the event of damage. Slightly textured gelcoat facings will not be accepted.

C. Finish on fiberglass frames must match that of the fiberglass doors to which they are installed. Gelcoated doors and polyurethane coated frames together as a unit will not be accepted.

2.06 ANCHORS, FASTENERS HARDWARE AND ACCESSORIES

A. Manufacturer's standard.

2.07 OTHER MATERIALS

A. All other materials not specifically described but required for the complete and proper installation of the work of this Section shall be new, first quality for their respective kinds and subject to approval of the Architect/Engineer.

PART 3 - EXECUTION

3.01 EXISTING CONDITIONS

A. Inspection:

1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point when this installation will properly commence.

3.02 INSTALLATION

A. General: Install fiberglass doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.
2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge locations on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
3. In existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with stainless steel expansion bolts and masonry anchorage devices.
4. For openings 90 inches (2286 mm) or more in height, install an additional anchor at hinge and strike jambs.

C. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

D. Door Installation: Fit fiberglass doors accurately in frames. Shim as necessary.

3.03 ADJUSTMENT AND CLEANING

A. Remove dirt and excess sealants or glazing compound from exposed surfaces.

B. Touch-up marred or abraded surfaces to match original finish.

C. Adjust moving parts for smooth operation.

D. Remove debris from Project site.

E. Cleaning: Clean fiberglass door and frame assemblies in accordance with manufacturer's recommended procedure.

END OF SECTION

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SECTION 08 33 13
ROLLING SERVICE DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Powered overhead rolling door at Equipment Storage Room Location.

B. Related Sections:

1. 13 34 23 – Salt Storage Structure

1.02 REFERENCES

A. ANSI/DASMA 108 - American National Standards Institute Standard Method For Testing Sectional Garage Doors And Rolling Doors: Determination Of Structural Performance Under Uniform Static Air Pressure Difference.

B. NFRC 102 - Test Procedure for Measuring the Steady-State Thermal Transmittance of Fenestration Systems.

C. ASTM E 90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Element.

D. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

E. ASTM A 653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

F. ASTM A 666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

G. ASTM A 924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

H. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

J. NEMA MG 1 - Motors and Generators.

1.03 DESIGN / PERFORMANCE REQUIREMENTS

A. Overhead coiling service doors:

1. Wind Loads: Design door assembly to withstand wind/suction load of 20 psf (958 Pa) without damage to door or assembly components in conformance with ASTM E 330.
2. Operation: Design door assembly, including operator, to operate for not less than 20,000 cycles.

B. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.04 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Details of construction and fabrication.
   4. Installation instructions.

C. Shop Drawings: Include detailed plans, elevations, details of framing members, anchoring methods, required clearances, hardware, and accessories. Include relationship with adjacent construction.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) long, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

G. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience in the fabrication and installation of security closures.

B. Installer Qualifications: Installer Qualifications: Company specializing in performing Work of this section with minimum three years and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
   1. Finish areas designated by Architect.
   2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
   3. Refinish mock-up area as required to produce acceptable work.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.

C. Store materials in a dry, warm, ventilated weathertight location.

1.07 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.08 COORDINATION

A. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

1.09 WARRANTY

A. Warranty: Manufacturer’s limited door and operator system, except the counterbalance spring and finish, to be free from defects in materials and workmanship for 3 years or 20,000 cycles, whichever occurs first.

B. Warranty: Manufacturer’s limited door system warranty for 2 years for all parts and components.

C. PowderGuard Finish
   1. PowderGuard Premium Applied to curtain, guides, bottom bar, headplates: Manufacturer’s limited Premium Finish warranty for 2 years.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: www.overheaddoor.com. E-mail: info@overheaddoor.com.

B. Substitutions: Raynor, Cornell or acceptable equivalent.

2.02 OVERHEAD COILING SERVICE DOORS

A. Heavy Duty Industrial Doors: Overhead Door Corporation, Model 620 Stormtite Service Doors.
   1. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached

to each end of alternate slats to prevent lateral movement.

a. Flat profile type F-265 for doors between 18 feet 4 inches (5.59 m) and 25 feet 4 inches (7.72 m) wide, fabricated of:

i. .050 inch (1.29 mm) aluminum.

2. Slats and Hood Finish:

a. Aluminum: Slats and hood shall be aluminum finished as follows.

i. Finish: Mill finish.

3. Weatherseals:

a. Vinyl bottom seal, exterior guide and internal hood seals.

b. Interior guide weatherseal.

c. Lintel weatherseal.

4. Bottom Bar:

a. Two galvanized steel angles.

5. Guides: Three structural steel angles.

6. Brackets:

a. Galvanized steel to support counterbalance, curtain and hood.

7. Finish; Bottom Bar, Guides, Headplate and Brackets:

a. Finish: Black powdercoat finish.

8. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.

9. Hood: Provide with internal hood baffle weatherseal.

a. Aluminum hood with intermediate supports as required.

10. Manual Operation:

a. Chain hoist for doors over 96 SF.

2.03 OPERATOR DESIGN

A. General

1. Overhead Doors:

a. Operator shall be equivalent to RHX Commercial Operators manufactured by Overhead Door Corp., or equal as approved by the Architect/Engineer. Provide 1 H.P., 230/460V voltage, 3 phase as indicated in the Electrical Drawings.

b. Door supplier shall provide all non-combustible mounting pads, struts, and girts necessary for mounting overhead doors to the designed wall construction.

B. Reduction

1. Furnish heavy duty worm gear drive running in oil with additional reduction by chain and sprockets.

C. Motors

1. Provide 480V three phase motors. Motors shall be separate from reduction mechanism for ease of maintenance.

D. Roller Chain Drive

1. Door shall be driven by roller chain at 6" to 12" per second.

E. Adjustable Friction Clutch

1. Shall be provided to protect door and operator if door movement is obstructed.

F. Starter - Reversing Contactor Type

1. Furnish heavy duty across the line reversing type with mechanical interlock.

G. Limit Switches
   1. Provide positive chain drive screw type limit switch, enclosed in electrical control box, easily accessible for precision setting.
   2. Provide limit switch for interlock of ventilation system.
   3. Provide limit switch for interlock of signal system.

H. Control Voltage
   1. Control voltage shall be 24 volts for safety.

I. Overload Protection
   1. Provide manual reset for overload protection.

J. Emergency Operation
   1. A disconnect shall be provided so door can be manually operated.

K. Magnetic Brake
   1. Furnish a magnetic solenoid brake for positive stop.
      a. Sensing Edge Protection:
         i. Electric sensing edge.
      b. Operator Controls:
         i. Push-button operated control stations with open, close, and stop buttons.
         ii. Controls for both interior and exterior location.
         iii. Controls surface mounted.

2.04 Windload Design:

a. Standard windload shall be 20 PSF.

2.05 Locking:

a. Interior slide bolt lock for electric operation with interlock switch.

2.06 Wall Mounting Condition:

a. Face-of-wall mounting.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify opening sizes, tolerances and conditions are acceptable.

B. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.

C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.

D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.

E. Coordinate installation of electrical service with Section 16150. Complete wiring from disconnect to unit components.

F. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07900.

G. Install perimeter trim and closures.

H. Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

3.04 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.05 CLEANING

A. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.06 PROTECTION

A. Protect installed products until completion of project.

END OF SECTION

SECTION 09 90 00
PAINTS AND COATINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:
   1. Painting of 2x4 fill height marker at salt shed interior walls.

B. Related Work Described Elsewhere:
   1. Priming or priming and finishing of certain surfaces are specified to be factory performed or installer performed under pertinent other Sections.

C. Work Not Included in This Section:
   1. Do not include painting which is specified under other Sections.
   2. Unless otherwise indicated, painting is not required on surfaces in concealed areas and inaccessible areas such as furred spaces, foundation spaces, utility tunnels, pipe spaces, and duct shafts.
   3. Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze, and similar finished materials will not require painting under this Section except as may be specified herein.
   4. Do not paint any moving parts of operating units; mechanical or electrical parts such as valve operators, linkages, sinkages, sensing devices, and motor shafts, unless otherwise indicated.
   5. Do not paint over any required labels or equipment identification, performance rating, name, or nomenclature plates.

D. Definitions:
   1. The term "paint", as used herein, means all coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers and other applied materials whether used as prime, intermediate or finish coats.

1.02 QUALITY ASSURANCE

A. Standards:
   1. Comply with standards specified in this Section and as listed in Section 01 42 00.

B. Qualification of Manufacturer:
   1. Product used in the work of this Section shall be produced by manufacturers regularly engaged in the manufacture of similar items and with a history of successful production acceptable to the Architect/Engineer.

C. Qualification of Workmen:
   1. Provide at least one person who shall be present at all times during execution of the work of this Section, who shall be thoroughly familiar with the specified requirements and the materials and methods needed for their execution, and who shall direct all work performed under this Section.

D. Paint Coordination:
   1. Provide finish coats which are compatible with the prime coats used.
   2. Review other Sections of these Specifications as required, verifying the prime coats to be used and ensuring compatibility of the total coating system for the various substrata.
   3. Provide barrier coats over incompatible primers, or remove the primer and re-prime as required.

1.03 SUBMITTALS

A. General:

1. Comply with provision of Section 01 33 00.

B. Manufacturer's Data:

1. Within 15 calendar days after Award of Contract, submit:

a. Complete materials list of all items proposed to be furnished and installed under this Section.

b. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements.

C. Samples:

1. Following the selection of colors and glosses by the Architect/Engineer as described in Article 2.01.B. below, submit samples as requested for the Architect/Engineer review:

a. Provide two samples of each color and each gloss for each material on which the finish is specified to be applied.

1.04 PRODUCT HANDLING

A. Delivery of Materials:

1. Deliver all materials to the Project site in original, new, and unopened containers bearing the manufacturer's name and label showing the following information:

a. Manufacturer name; type of material

b. Thinning and mixing instructions.

c. Manufacturer's stock number and batch number

d. Application instructions.

e. Color: name and number.

f. Federal Spec. No., if applicable

g. Contents by volume of major pigment and vehicle constituents

1.05 JOB CONDITIONS

A. Surface Temperatures:

1. Do not apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounding air temperatures are below 45 degrees F, unless otherwise permitted by the manufacturer's printed instructions as approved by the Architect/Engineer.

B. Weather Conditions:

1. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85%; or to damp or wet surfaces; unless otherwise permitted by the manufacturer's printed instructions as approved by the Architect/Engineer. Applications may be continued during inclement weather within the temperature limits specified by the paint manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.01 PAINT MATERIALS

A. Design is based on the use of paint products manufactured by Devoe (ICI Dulux), Glidden (ICI Dulux), Hallman Lindsay, Pittsburgh Paints, Sherwin-Williams, Tnemec, and Diamond Vogel Paint Products and the materials of the manufacturer named in the Painting Schedule.

B. Colors and Glosses:

1. The Architect/Engineer will select colors to be used in the various types of paint specified and will be the sole judge of acceptability of the various glosses obtained from materials proposed to be used by the Contractor.

C. Undercoats and Thinners:

1. Provide undercoat paint produced by the same manufacturer as the finish coat. Use only the thinners recommended by the paint manufacturer, and use only to the recommended limits. Insofar as practicable, use undercoat, finish coat, and thinner material as parts of a unified system of paint finish.

D. Standards:

1. Provide paint materials which meet or exceed the standards listed for each application in the Painting Schedule in Part 3 of this Section.

2.02 APPLICATION EQUIPMENT

A. General:

1. For application of the approved paint, use only such equipment as is recommended for application of the particular paint by the manufacturer of the particular paint, and as approved by the Architect/Engineer.

B. Other Materials:

1. All other materials, not specifically described, but required for a complete and proper installation of the work of this Section, shall be new, first-quality of their respective kinds, and as selected by the General Contractor subject to the approval of the Architect/Engineer.

PART 3 - EXECUTION

3.01 SURFACE CONDITIONS

A. Inspection:

1. Prior to installation of the work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.

B. Discrepancies:

1. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.02 MATERIALS PREPARATION

A. General:

1. Mix and prepare painting materials in strict accordance with the manufacturer's recommendations as approved by the Architect/ Engineer.

3.03 SURFACE PREPARATION

A. General:

1. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's recommendations as approved by the Architect/Engineer.
2. Remove all removable items which are in place and are not scheduled to receive paint finish, or provide surface applied protection prior to surface preparation and painting operations.
3. Following completion of painting in each space or area, reinstall the removed items by using workmen skilled in the necessary trades.

B. Preparation of Metal Surfaces:

1. Thoroughly clean all surfaces until they are completely free from dirt, oil, and grease.
2. On galvanized surfaces, use solvent for the initial cleaning and then treat the surface thoroughly with phosphoric acid etch. Remove all etching solution before proceeding.
3. Allow to dry thoroughly before application of paint.

4. Aluminum Conduit:
    a. Interior, Non-Immersion
    b. Surface Preparation: SSPC-SP1 “Solvent Cleaning”, and dry.
5. Exterior Metal, Ferrous:
    a. Surface Preparation: SSPC-SP6 “Commercial Blast Cleaning” – Field.
6. Interior Metal, Ferrous:
    a. Surface Preparation: SSPC-SP3 “Power Tooled Cleaning” and Solvent Wiped Field.
7. Steel Joists - Interior Exposure:
    a. Surface Preparation: Clean and dry, and SSPC-SP2 “Hand Tool Cleaning” – Field.

C. Preparation of Gypsum Wallboard Surfaces:
1. Preparation of Gypsum wallboard surfaces shall be as per the requirements in Section 09 29 00 - Gypsum Wallboard.

D. Preparation of Concrete and Masonry Block Surfaces to be Painted:
1. Fill cracks and irregularities with portland cement grout to provide uniform surface texture.
2. Fill concrete masonry unit surfaces with block filler.
3. Surface shall be cured, clean, and dry.

3.04 PAINT APPLICATION

A. General Requirements:
1. Do not apply initial coating until moisture content of surface is within limitations recommended by paint manufacturer. Test with moisture meter.
2. Apply paint, enamel, stain, and varnish with suitable brushes, rollers, or spraying equipment.
    a. Rate of application shall not exceed that as recommended by paint manufacturer for the surface involved less than 10% allowance for losses.
    b. Keep brushes, rollers, and spraying equipment clean, dry, free from contaminates and suitable for the finish required.
3. Apply stain by brush.
4. Comply with recommendation of product manufacturer for drying time between succeeding coats.
5. Vary slightly the color of successive coats.
6. Sand and dust between each coat to remove defects visible from a distance of five feet.
7. Finish coats shall be smooth, free of brush marks, streaks, laps or pile up of paints, and skipped or missed areas. Finished metal surfaces shall be free of skips, voids or pinholes in any coat when tested with a low voltage detector.

B. Inspection:
1. Do not apply additional coats until completed coat has been inspected by the Architect/Engineer.
2. Only inspected coats of paint will be considered in determining number of coats applied.
3. Leave all parts of moldings and ornaments clean and true to details with no undue amount of paint in corners and depressions.
4. Make edges of paint adjoining other materials or colors clean and sharp with no overlapping.
5. Apply primer on all work before glazing.

6. Change colors at doors where colors differ between adjoining spaces or rooms and where door frames match wall colors.
7. Refinish entire wall where portion of finish has been damaged or is not acceptable.

C. Painted Work:
1. Back prime all interior trim.
2. Runs on face shall not be permitted.

D. Cleaning:
1. Touch-up and restore finish where damaged.
2. Remove spilled, splashed or splattered paint from all surfaces.
3. Do not mar surface finish or item being cleaned.
4. Leave storage space clean and in condition required for equivalent spaces in Project.

E. Completed work shall match the approved samples for color, texture, and coverage. Remove, refinish, or repaint all work not in compliance with specified requirements.

3.05 PAINTING SCHEDULE

A. General:
1. Painting required under this Section is specified herein and shown on the Drawings.

B. 2x4 Wood fill marker:
1. Color Safety Yellow: Sherwin Williams Porch and Floor Enamel, Satin Sheen

C. Concrete Wall Coating:
1. See specification section 07 11 00 – Dampproofing.

END OF SECTION

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SECTION 10 80 00
MISCELLANEOUS SPECIALTIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:
   1. Provide miscellaneous specialties complete, in place, as shown on the Drawings, specified herein, and needed for a complete and proper installation.

1.02 QUALITY ASSURANCE

A. Standards:
   1. Comply with standards specified in this Section.

B. Qualifications of Manufacturer:
   1. Use products in the work of this Section produced by manufacturers regularly engaged in manufacture of similar items and with a history of successful production acceptable to the Architect/ Engineer.

C. Qualifications of Installers:
   1. Use skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.03 SUBMITTALS

A. General:
   1. Comply with provisions of Section 01 33 00.

B. Manufacturer's Data:
   1. Within 15 calendar days after Award of Contract, submit:
      a. Complete materials list of all items proposed to be furnished and installed under this Section;
      b. Manufacturer's specifications and other data required to demonstrate compliance with the specified requirements;
      c. Shop drawings showing components, arrangements, dimensions, orientation on walls, sections of trim members, dimensioned elevations, grounds, reinforcements, and accessories.

1.04 PRODUCT HANDLING

A. Protection:
   1. Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

B. Replacements:
   1. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 BOLLARD COVERS

A. BollardGard BC752 Reflective Bollards by Innoplast, for fitting over standard interior and exterior 8” steel bollards.
   1. Diameter = 8.1” inside/8.35” outside
   2. Wall Thickness = .125” HDPE

3. Length = 72”.
4. Color = Yellow w/ Red Reflective Tape Stripes

2.02 BIRD SCREEN

A. 19 GA. Wire, hot dipped galvanized bird screen.
1. ½” Square mesh.
2. Install with galvanized fasteners at overhang soffit areas to prevent bird intrusion.

2.03 OTHER MATERIALS

A. All other materials, not specifically described, but required for a complete and proper installation of the work of this Section, shall be new, first-quality of their respective kinds, and as selected by the Contractor subject to the approval of the Architect/Engineer.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the proper and timely completion of the work to approval of the Architect/Engineer. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install in locations shown on the Drawings, as specified herein, and at mounting heights per manufacturer’s recommendations, and in accordance with the manufacturer's instructions. Furnish and install all grounds, brackets, anchors, trim and accessories for a complete installation.

3.03 FINAL INSPECTION

A. The manufacturer's recommended installation procedures, when approved by the Architect/Engineer, will become the basis for inspecting and accepting or rejecting actual installation procedures used on this work.

END OF SECTION

SECTION 13 34 23
SALT STORAGE BUILDING

PART 1 - GENERAL

1.01 SUMMARY

The work under this item shall consist of furnishing and installing a complete structure for the storage of salt and sand/salt.

The building shall be weather tight, and suitable for the storage of salt and other materials used for roadway abrasives. The design of the foundations of the building shall be provided as part of the manufacturer's building design, based on information obtained by means of a subsurface investigation and geotechnical analysis provided by the owner.

Building shall be rectangular with reinforced concrete foundation walls to withstand lateral load of internal material pile without the aid of external wall bracing. The building shall have a gable roof, with overhead door and man door for closure at one end.

-92' Length

-72' Width

-30' Internal Vertical Height Clearance (eaves)

-Capacity:

The building shall hold 4,000 tons salt based on 12' pile height at the wall and extending toward center of building at an angle not to exceed 2 horizontal to 1 vertical, for a maximum pile height of 25'. Area near entrance that is unsuitable for covered material storage due to natural angle of repose should be excluded from capacity calculations. Pile calculations should be based on material weight of 80 pcf for salt. Written calculations and pile diagrams must be provided.

1.02 QUALIFIED MANUFACTURER

A. Manufacturers other than those listed in this specification, to be eligible for award of bid, shall have at least ten (10) years of successful experience in the design and fabrication of salt storage buildings. Bidder shall provide at least 5 project references with the bid proposal. Reference information shall include project location, building size, date of completion and owner contact information.

B. Manufacturer shall employ a registered professional engineer in the state of Wisconsin. Engineer shall reside within the state and shall be available to make frequent site visits during construction.

1.03 SYSTEM PERFORMANCE REQUIREMENTS

The building shall be designed to meet the requirements of the purpose intended and all applicable Town, County and State Codes.

Wall of the building must be designed to withstand a lateral pressure from material stored to a maximum height of 25'. Design to be based on material weights as specified in part 1.01 Capacity.

Building roof shall be watertight.

1.04 SUBMITTALS

A. General:

1. Comply with provisions of Section 01 33 00.

B. General: Submit the following in accordance with Conditions of the Contract and Division 1 Specification Sections.

C. Product data consisting of storage building system manufacturer's product information for building components and accessories.

D. Shop drawings for storage building structural framing system, siding panels, and other building system components and accessories that are not fully detailed or dimensioned in manufacturer's product data.

E. Furnish the following information as proof of conformity to design and performance criteria requirements of this specification. The information (for both submittal phases, below) shall be stamped with the registration seal of an architect or professional engineer, licensed in the state of Wisconsin and bearing the original stamp and signature of such architect or professional engineer.

F. Furnish a complete set of properly certified design drawings, indicating in detail all features of the proposed building.

G. The submittal shall include the following information at a minimum:

1. Complete design calculations for building and foundation work.

2. For prefabricated structures: original working drawings, or copies of complete fabrication and erection drawings, material lists, and detailed erection instructions.

3. Foundation work: detailed drawings for preparation and construction.

1.05 WARRANTY

A. Siding Panel Finish Warranty: Furnish the siding panel manufacturer's written warranty, covering failure of the factory-applied exterior finish on metal wall panels within the warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.

1. Warranty period for factory-applied exterior finishes on wall panels is 20 years after the date of Substantial Completion.

1.06 QUALITY ASSURANCE

Contractor shall be responsible for the duration of construction for all products, components, accessories, and methods used in constructing the building.

The minimum printed code standard requirements of the following organizations for material quality, fabrication, and installation procedures shall be met or exceeded, for applicable methods employed in the building design:

American Institute of Steel Construction	(AISC)
American Concrete Institute	(ACI)
American Institute of Timber Construction	(AITC)
American Iron and Steel Institute	(AISI)
American Plywood Association	(APA)
American Softwood Lumber Standard: U.S. Department of Commerce PS-20	
International Building Code, current edition	(IBC)
National Design Specifications for Wood Construction	(NDS)
Truss Plate Institute standards	(TPI)
Underwriters Laboratories, Inc.	(UL)
Canadian Standards Association	(CSA)
American Standards for Testing Materials	(ASTM)
Wisconsin Comm SBS-316	

1.07 STATE PLAN APPROVAL

Building manufacturer shall be responsible for obtaining approved building plans from the Wisconsin Department of Safety and Professional Services (DSPS). Manufacturer shall be responsible for scheduling DSPS review and paying for all associated fees.

1.08 CODE COMPLIANCE

Build the structure in conformance with all applicable codes. Consult the state of Wisconsin and the municipality's website for information on all adopted codes and other ordinances. The governing building code is the 2015 Wisconsin Commercial Building Code SPS 360-366, which adopted by reference the 2015 International Building Code and companion codes.

1.09 BUILDING STRUCTURAL REQUIREMENTS

Provide a rigid, self-supporting structure comprised of standard building framing components, or an approved building system of integrated structural components, complete with necessary foundations which are designed to securely and permanently support wall and roof construction. Design building to meet or exceed the following minimum structural design criteria:

1. Ground Snow Load: 30 PSF
2. Lateral Wind Load: 105 mph (3-second gust), Exposure C
3. Net Allowable Soil Bearing Pressure: 3,000 PSF. See Geotech report in project manual appendix.
4. Seismic Design Category: A
5. Frost Depth: 4.0 feet, see Geotech Report, in project manual appendix.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer: Subject to compliance with specified requirements, provide salt storage building system provided by one of the following:
   1. Wheeler Salt Storage Buildings, 9531 W 78th Street, Suite 100, Eden Prairie, MN 55344 (800) 929-2909.
   2. Or approved equivalent product, during the bidding period.

2.02 MATERIALS

ENTRANCES:

See Section 08 22 00 Fiberglass Doors and Frames and Section 08 33 13 Rolling Service Doors for requirements.

STRUCTURAL FRAME:

Shall consist of vertical rectangular wood posts set 4' apart center to center and extended below finished grade to concrete footing. Posts shall be long enough to provide internal clearance height specified in NOMINAL BUILDING DIMENSIONS. Posts may be rough lumber.

Vertical wall posts shall be founded and supported by a continuous cast-in-place concrete “T-Wall.” “T-Wall” shall consist of a reinforced concrete spread footing and vertical concrete column, as designed by the salt storage building manufacturer’s engineer. Timber posts shall anchor into both the spread footing and vertical column. Only timber members shall be used in areas that come in contact with salt. Salt contact with concrete members will not be permitted.

No bracing will be allowed on the interior or exterior that extends away from the wall and conflicts with the Owner’s equipment movements.

CONCRETE:

All concrete and reinforcement shall be in accordance with the building code requirements for structural concrete (ACI 318). For design purposes, all concrete shall be 4000 psi normal weight. All reinforcement steel shall be grade 60, **epoxy coated**.

Note: Concrete shall not be used where it is in direct contact with salt.

PIPE BOLLARDS:

See specification section 05 50 00. Furnish and install pipe bollards at locations shown on plans, minimum eight inches (8”) in diameter and ten feet (10’-0”) in length, consisting of schedule 80 galvanized steel structural pipe, filled with concrete. Furnish concrete within the pipe bollard according to Section 03 30 00 of the standard specifications. Form concrete crown at top of bollard. Embed pipes in concrete footing. Cover with yellow plastic innoplast cover per specification section 10 80 00.

SIDING:

Internal load walls shall have horizontal treated timber planks (minimum 12” nom. in width) and treated plywood nailed on the inside of wall posts. Plank thickness and stress grade shall be adequately sized to withstand lateral material pressure and shall be a minimum thickness of 2” nom. in single application. The plank shall extend two feet higher than design pile load line of the wall. Marker shall be provided to designate the maximum pile height on the wall. Design calculations must include analysis of wall plank thickness and stress grade.

Wall planks shall be rough lumber; however, the sides shall be SIE (surfaced on one edge to 11-5/8") to fit tight against adjacent planks. Planks or plywood shall extend upward to the eaves.

Exterior door wall and gable ends of the roof shall be furnished with 5/8” CDX T1-11 grooved plywood orientated with the grooves vertical.

ROOF:

A. Provide materials and surface finishes conforming to the guarantee specified below, requiring minimum maintenance and conforming to, or exceeding, the Underwriters’ Laboratories, Inc. Class C rating requirements (labels are not required). Unprotected aluminum or bare steel surfaces are not acceptable.

   1. Type: Prefabricated or site-built, complete with all necessary accessories, fastening devices, trim, and flashings.

   2. Drainage: Positive slope; no standing water.

   3. Strength: comply with structural criteria specified on drawings.

   4. Wind Resistance: 60 pounds per square foot (uplift) for adhesive applied products, UL Standard 997 for shingle type products.

   5. Compatibility: All materials to be physically and chemically compatible with each other and with adjacent building components.

6. Products:

   i. Metal roofing shall be per specification section 07 61 20 – Metal Roofing.

   ii. Trim: Provide metal rake trim at all edges and slope changes

   iii. Underlayment shall conform to ASTM D1970, Standard Ice Dam Underlayment.

   iv. Sheathing shall be APA rated, 5/8-inch thick nominal, CDX plywood roof sheathing. In no case shall metal roofing be applied directly to trusses.

VENTILATION:

Provide suitable openings located at or near the highest point of the roof to provide a minimum ratio of 1 square inch of free air area for each 55 square feet or building area. Color to match adjacent roofing materials.

Provide wooden louver vents with minimum area of 3 square-feet each at each gable end of building.

TRANSLUCENT PANELS:

Provide 4'-0" high, minimum, polycarbonate translucent sidewalls as shown on the drawings.

WOOD BUILDING MATERIALS:

All materials shall be unused.

All items shall be inspected visually, at the erection site, for conformance with these specifications and the final design as approved by the Owner. If deemed necessary by the Owner, onsite samples will be taken by the Owner and submitted to a testing laboratory selected by the Owner and tested to verify compliance with the specifications and final design.

Timber:

All structural timber products furnished for the building shall be in conformity with the National Design Specifications for Wood Construction, 2015 Edition as published by the National Forest Products Association. This includes all source documents including all lumber grading rules. Suppliers must provide inspection certificates for posts, wall plank and main structural elements certifying compliance with the stress grade required as indicated by the design calculations and as indicated on the plans. All certifications shall be furnished to owner prior to delivery of the material. All structural timber for the wall system shall be Coastal Douglas Fir, other timber species will not be allowed.

Plywood:

Each panel of construction plywood shall be identified with the grade - trademark of the American Plywood Association, and shall meet the requirements of Product Standard "PS-1" for Construction and Industrial Plywood. Plywood roof sheathing shall be C-D interior with exterior glue.

Copper Naphthenate Pressure Treatment:

Preservative treatment of lumber and timber shall be by the pressure process, and unless otherwise provided in the contract special provisions, be in accordance with AWPA Standards and AASHTO Designation M 133.

Preservative and Preservative Treatment shall be in accordance with the American Wood Preservers' Association (AWPA) Standards.

All timber below the roof trusses shall be pressure treated with Copper Naphthenate in AWPA P9 Type A Hydrocarbon Solvent.

Unless otherwise directed by the Owner the material shall be graded prior to treatment. Material shall be accepted after treatment on the basis of its condition prior to treatment, on the basis of inspection of the treatment procedure substantiated by plant records, on the condition of the material after treatment and on absorption, penetration and visual inspection.

So far as practicable all adazing, boring, chamfering, framing, gaining, mortising, surfacing and general framing, etc., shall be done prior to treatment. If cut after treatment, coat cut surfaces according to AWPA M4.

All Douglas Fir or other species that are difficult to penetrate shall be incised prior to treatment.

Metal Plates and Fasteners:

All hardware and plates shall be hot dip galvanized. **Metal gusset plates on roof trusses shall be field painted with asphalt paint.** The supplier shall furnish the paint.

PART 3 - EXECUTION

3.01 ERECTION OF FRAMING

Do not use materials that are unsound, warped, improperly finished, or with defective surfaces, sizes, or patterns.

Comply with frame manufacturer's approved Shop Drawings for details and building erection.

Columns:
Auger hole to depth of diameter indicated on Drawings.
Construct column foundations per Salt Storage Building Designer Drawings.
Wallboards: Install using manufacturer recommended fasteners.

Provide all required footings, foundations, and/or other required substructures or supports at the required elevations on properly prepared subgrade, as required for the erection of the complete storage building.

Foundations shall be of size and depth required to resist frost action.

Roof Joists:
Set joists in place in center of column using lifting methods as approved by manufacturer.

Cable Ties: Install cable ties at locations recommended by building manufacture and per approved Shop Drawings.

END OF SECTION

SECTION 26 00 00
ELECTRICAL SCOPE OF WORK

PART 1 - GENERAL

1.01 SCOPE OF WORK

Contractor shall provide all labor, materials, equipment, permits, inspection fees, supervision and other items noted in Contract General Conditions, necessary to yield completely operable, code compliant, and tested systems as shown on the drawings and specified herein. The work includes, but is not limited to, the following areas:

A. Lighting Systems
   1. Building mounted exterior lighting.
   2. Interior lighting system including fixtures and components for their complete installation.
   3. Individual lighting control devices and low voltage lighting control system.

B. Electric Power System
   1. Electrical power distribution including the following:
      a. Panelboards.
      b. Overcurrent protection devices.
      c. Disconnect switches.
      d. Feeders.
      e. Branch circuit wiring.
   2. Electrical devices including the following:
      a. Special outlets.
      b. Receptacles.
   3. Motor control equipment
      a. Disconnects.

1.02 RELATED SECTIONS

A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.03 ALTERNATES

A. Refer to Section 01 23 00 for a list of alternates.

1.04 UNIT PRICES

A. Refer to Section 01 22 00 for required unit prices.

PART 2 - PRODUCTS

2.01 Not Used

PART 3 - EXECUTION

3.01 Not Used

END OF SECTION

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SECTION 26 01 00
GENERAL ELECTRICAL PROVISIONS

PART 1 - GENERAL

1.01 SUMMARY

A. These specifications set forth conditions, and include the work to be performed, equipment to be installed, and certain methods to be employed to implement a complete and operable electrical installation. This specification shall apply to all electrical work to be performed as listed in Section 26 00 00 Electrical Scope of Work as well as any other electrical work required of other trades or by Sections of this Project Manual.

B. Related Documents

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.

1.02 REFERENCES

A. National Fire Protection Agency:

1. NFPA 70 - National Electrical Code
2. NFPA 72 – National Fire Alarm Code
3. NFPA 101 - Life Safety Code

B. State of Wisconsin Department of Safety and Professional Services

1. SPS 316 – Electrical Code
2. SPS 363 - Energy Conservation

C. Local Code and Inspector Requirements

D. Local Utility Service Rules and Requirements

1.03 CODES AND STANDARDS

A. Comply with Section 01 42 00 – Reference Standards.

B. Specific naming of codes or standards occurs on the Drawings, and in other Sections of these Specifications.

C. These specifications are minimum requirements and shall govern except where made more stringent by other sections of this specification or local, state or federal laws or regulations. Where conflict between drawings, specifications, codes or standards occurs, the more stringent requirements shall govern. No extra compensation for such compliance will be allowed.

D. Submission of proposal is considered evidence that the Contractor is proficient and experienced, and knowledgeable of all standards, codes, ordinances, permits and regulations affecting his work.

1.04 PERMITS, INSPECTIONS, AND UTILITY CONNECTIONS

A. The Contractor shall prepare and submit all applications and working drawings, as required by the General Conditions and the Supplemental/Special Conditions, to the authorities having jurisdiction over the project. All licenses and permits shall be secured and paid for by the Contractor in accordance with the General and Supplemental/Special Conditions of the project.

B. The contractor shall obtain and pay for any underground locates, public or private, prior to starting work for the execution of this work. Scheduling of all underground locates shall be responsibility of the contractor.

1.05 EXAMINATION OF PLANS, SPECIFICATION, AND SITE

A. Before submitting a bid the contractor shall be familiar with all features of the building and site which may affect the execution of his work. No additional payment will be allowed for work resulting from the failure to obtain this information. The contractor shall clarify any omissions or errors in the plans specifications with architect or engineer before submitting his bid.

1.06 DRAWINGS

A. The drawings depicting electrical work are diagrammatic and show symbols representing electrical equipment and devices in their approximate location. The exact location of such equipment and devices shall be established in the field in accordance with instructions from the Architect/Engineer and as established by manufacturer's installation drawings and details.

1. Coordinate the location of equipment and devices with the other trades performing work in the area.
2. Refer to shop drawings and submittal drawings for all equipment requiring electrical connections to verify rough-in and connection details.
3. Dimensions noted on the electrical drawings are subject to measurements of adjacent and previously completed work.
4. Dimensions shall not be derived by scaling drawings.

B. The Contractor shall keep a detailed set of record drawings in accordance with Section 01 78 39. The record drawings shall include all conduit and feeder runs, pull box locations, and any deviations from the Contract Drawings.

1.07 SUBMITTALS AND SUBSTITUTIONS

A. Comply with Section 01 33 00 – Submittal Procedures in addition to the following requirements.

B. Comply with the specific submittal requirements of each specification section in addition to the following requirements.

C. Approval of equipment, fixtures, methods, etc. proposed as alternates to those called for in the plans may be obtained by the following process. Consideration of alternate equipment shall be solely at the discretion of the Engineer. No alternates to the plans and specifications will be accepted except those given prior approval as follows.

1. Any and all proposed alternate equipment, fixtures, methods, etc. must be submitted for approval not less than ten (10) days prior to bid due date. Submittals shall be equivalent to those required for review as noted herein.
2. After review of the submittals the Engineer will determine acceptability of alternate proposals. All acceptable alternates will be made known to prospective contractors through the means of communication deemed best by the Engineer.

D. Submit all materials and equipment for review. Each sheet of descriptive literature submitted shall be clearly marked to identify the material or equipment as follows:

1. Submit schematics and connection diagrams for all electrical equipment. A manufacturer's standard connection diagram or schematic showing more than one scheme of connection will not be accepted unless it is clearly marked to show the intended connections. Sequence of operation shall be worded to indicate the progression of operation of all pushbuttons, limit switches, relays, solenoids and all other control devices.
2. Equipment and materials descriptive literature not readily cross-referenced with the drawings or specifications shall be identified by a suitable notation.
3. Lamp fixture descriptive sheets shall show the fixture schedule letter, number, or symbol for which the sheet applies.

4. Product sheets showing UL approved systems & materials for fire stopping. Identify the fire wall or floor where the product will be applied.
5. Sheets or drawings showing more than the particular item under consideration shall have crossed out all but the pertinent description of the item for which review is requested.
6. Equipment and materials descriptive literature and drawings shall show the specification paragraph for which the equipment applies.
7. The Contractor shall submit within thirty (30) days of the award of the contract for the Engineer's approval and prior to any purchase of the items, electronic PDF files or six (6) copies of materials, equipment, devices (including outlets and switches), conduit and wire, and fixtures proposed to be incorporated within the work. Where manufacturers are indicated for an item in the specification, only designation by catalog number of the manufacturer of the item to be used shall be required. All other items shall be listed with catalog numbers and descriptive information. The list must be complete to receive consideration. Items judged by the Engineer to be in non-conformance may be rejected.
8. The Electrical Contractor shall review all submittals prior to submission.
    a. The Contractor shall verify that the materials and equipment depicted will properly fit into construction.
    b. Where equipment connections and/or locations are dependent on equipment provided by other trades, obtain submittal documentation from said trades to verify accurate coordination.
    c. Documents submitted without Contractor’s review stamp will be returned to Contractor prior to Architect/Engineer review.
9. No materials or equipment subject to prior review by the Architect/Engineer shall be fabricated or installed by the Contractor without approval. The Architect/Engineer’s review of the submittals does not relieve the Contractor of the responsibility of deviations from the requirements of the drawings and specifications, unless prior written approval for such deviations has been granted.
10. The Contractor shall assemble and submit to the Architect/Engineer for subsequent submission to the Owner, complete Operation and Maintenance manuals in accordance with Section 01 78 23 for each of the installed systems.

1.08 TEMPORARY FACILITIES

A. Comply with the requirement of Section 01 50 00 Temporary Facilities/Controls.

B. The Electrical Contractor shall provide all labor and material for temporary power and lighting required in construction for all trades until the permanent system is in operation. Where a temporary electrical service is required, Contractor shall arrange all necessary requirements with the local utility.

C. The Electrical Contractor shall include the following facilities in the temporary power and lighting service for the entire project:
    1. The temporary lighting system shall be sufficient to enable all trades to safely complete their work. Illumination shall be 5 footcandles minimum in all areas and, in addition, shall meet or exceed the requirements of 29 CFR 1926.56 Illumination (OSHA regulations).
    2. Temporary lighting system shall be circuited and controlled so that the lighting level in each portion of the building can be reduced to provide security lighting during non-working hours and on weekends and holidays. The level of lighting for security purposes shall be in accordance with all federal, state and local regulations. The Electrical Contractor shall be responsible for the control of the temporary lighting such that the lighting is turned on at the beginning of each workday and the normal working lighting is reduced to the security lighting level at the end of each workday.

3. After installation of the permanent lighting system, it may be used for construction lighting as required.
4. Complete installation shall be in compliance with all applicable codes. Electrical Contractor's bid will allow removal and salvage for any temporary service when it is no longer required.
5. The Owner shall pay for all electricity consumed throughout the duration of construction.

1.09 NEGLIGENCE

A. Should the electrical contractor fail to provide materials, templates, or other necessary information causing delay or expense to another party, he shall pay the actual amount of the damages to the party who sustained the loss.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Material and equipment shall be furnished new.

B. All material and equipment shall be listed by Underwriters' Laboratories, Inc. and shall bear UL listing labels where a UL test or standard exists.

C. Products shall be by established manufacturers regularly engaged in making type of materials to be provided and complete with all parts, accessories, trimmings, connections, etc. reasonably incidental thereto as specified in detail or as described in manufacturer's catalog. All equipment shall be properly cleaned, adjusted, and put in complete working order ready for service.

2.02 SUPPORTING DEVICES

A. Channel Support Systems
   1. U-Channels: Roll formed from 12-gauge steel. U-Channel width 1.5/8”, height shall be sized for the application of the channel and the device it supports.
      a. Channel for indoor, dry application shall have one of the following finishes.
         i. Pre-Galvanized Zinc Coating – ASTM A525 G-90
         ii. Finish equal to B-Line Dura-Green®™ or Unistrut Perma-Green®™
      b. Channel for outdoor, wet and damp application shall have Hot-Dipped Galvanized After Fabrication – ASTM A123 finish.
   2. Fittings and accessories:
      a. Fittings and accessories shall be manufactured by the U-Channel manufacturer.
      b. Indoor, dry application finish: Electro-plated Zinc – ASTM B633.
      c. Outdoor, wet, and damp application finish: Hot-Dipped Galvanized after Fabrication – ASTM A123.

B. Plywood backboards shall be ¾” minimum thickness, fire rated, and painted on all sides.

C. Fastening Hardware including screw, bolts, nuts, washers, etc. shall be stainless steel in outdoor, wet or damp locations.

D. Plastic anchors shall not be used.

E. Concrete or masonry anchoring systems shall be applied per manufacturer’s recommendations for base material and load applications.

2.03 ACCESS PANELS

A. All access panels required by code or otherwise to electrical service equipment shall be supplied and installed by Electrical Contractor.

B. Access panel sizes and locations shall be coordinated with all other trades. Where possible, locate equipment requiring access with equipment of other trades. Where access panels are shared between trades, costs of access panels and installation shall be split between trades requiring them.

PART 3 - EXECUTION

3.01 EQUIPMENT INSTALLATION REQUIREMENTS

A. Install all components, level, plumb, and parallel and perpendicular to other building system components, except where specifically noted.

B. Install all equipment to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnection with minimum interference of installation with other systems.

C. Coordinate equipment locations with equipment and systems installed by other trades. Where a conflict arises, notify the Architect/Engineer and obtain approval for an alternate location before proceeding with installation.

D. Verify equipment dimensions to insure dimensional compatibility.

3.02 CUTTING AND PATCHING

A. Comply with the requirements of Section 01 73 29

B. Cutting and patching shall not impair the strength or function of work being cut, i.e. structural members shall not be weakened, and holes through exterior walls shall be waterproofed.

C. No structural members shall be cut without prior approval from the Architect/Engineer.

D. Repair disturbed surfaces to match adjacent undisturbed surfaces.

3.03 FIRESTOPPING

A. All penetrations through walls, floors, and partitions shall be sealed.

B. Sealants and sealing systems shall restore the fire resistive rating of the wall, floor, or partition that is penetrated.

3.04 TRENCHING

A. Cover Material of trench

1. Cover Material: Unwashed bank-run sand or crushed bank-run gravel consisting of durable particles ranging in size from fine to coarse in a substantially uniform combination. Conform to the following gradation:

Cover Material	
Percent Passing	
Sieve Size	By Weight
1 Inch	100
3/4 Inch	85-100
No. 4	35-65
No. 40	15-35
No. 200	5-15

2. Base Material:

a. Excavated Material: Natural soils classified in ASTM D 2487 as Gravels (GW,

GP GM and GC), Sands (SW, SP, SM and SC) and Silts and Clays (ML and CL). Silts and Clays classified as OL, MH, CH, OH, and PT are not acceptable unless specifically allowed by Architect/Engineer. Soil material shall be free from vegetable or other organic matter, trash, debris, stones larger than three inches and frozen material.

3. Backfill Material:
   a. Raising Site Grades: Silty Clay with moisture content of 2 to 3 percent of optimum moisture content. Lifts not to exceed 6" in loose thickness and compacted to a minimum 95%.
   b. Final Inches of Fill Material: Not more than 5% passing No. 200 sieve.

B. Backfilling
   1. Backfill trenches to contours and elevations with unfrozen materials.
   2. Do not backfill over wet, frozen or spongy sub-grade surfaces.

3.05 TESTS

A. The Electrical Contractor shall conduct all tests required to ensure proper installation and operation off all components of the electrical system. The Electrical Contractor shall provide all instrumentation and labor necessary to conduct these tests. The engineer may require that he or his authorized representative be present for any required test.

B. During the course of construction, conduct the following tests, tabulate data, date, sign and submit to the Engineer. Further tests may be required to ensure proper operation of the electrical system.
   1. Standard megger insulation test on each feeder.
   2. Ground resistance test.
   3. Check motors for proper rotation.
   4. Ensure that all phase conductors are entirely free from grounds and short circuits.

C. Aim all adjustable lighting fixtures.

D. Adjust all auxiliary systems for optimum performance.

3.06 PLACING OF SYSTEMS IN OPERATION

A. The Electrical Contractor shall be responsible for all start-up procedures and system checks.

B. All equipment shall be installed, tested and operated in accordance with the respective manufacturer’s recommendations.

3.07 GUARANTEES

A. All labor, materials and equipment shall be guaranteed in writing by installing contractor for one year after final acceptance date and/or normal continuous complete season's operation applicable to equipment or system.

B. Acceptance date shall be determined by Architect/Engineer and stated in writing. Contractor shall secure equal guarantees from suppliers.

C. Contractor shall make all necessary alterations, repairs, adjustments and replacements during guarantee period as directed by Architect/Engineer to comply with Contract Documents, at no cost to the Owner.

D. Repair or replacements made under the guarantee provision shall bear further one-year guarantee from date of acceptance of repair or replacement.

3.08 INSPECTION

A. Upon completion of the work described under these specifications and drawings, the Electrical Contractor shall obtain and pay for inspection and approval by the local electrical

inspecting authority. One (1) certified copy of the inspection report shall be delivered to the Architect/Engineer.

3.09 HOUSEKEEPING AND CLEANUP

A. Daily remove from the site all debris and rubbish accumulating as a result of the electrical installation. Upon completion of the project, dispose of all debris and rubbish and leave manholes and electrical equipment rooms broom clean. Clean the interiors of all cabinets, pull-boxes and equipment enclosures.

3.10 PRODUCT HANDLING

A. Protection: Equipment shall be constructed and packaged to withstand all stress induced in transit and during installation.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.

3.11 DISCREPANCIES

A. In the event of discrepancy, immediately notify the Architect/ Engineer.

B. Do not proceed with the installation in areas of discrepancies until all such discrepancies have been fully resolved.

3.12 START-UP ASSISTANCE

A. The Electrical Contractor shall provide electricians to assist with the equipment start-up, including but not limited to, the following:

1. Vacuum and blow out all electrical panels.
2. Change motor rotation as required.
3. Exchange wires incorrectly landed on terminal strips.
4. Increase overload element sizes when insufficient to carry the load served.
5. Measure and record all panelboard voltage and motor-running currents.
6. Correct all wiring errors.

3.13 OPERATION AND MAINTENANCE MANUALS

A. The Contractor shall assemble and submit to the Architect/Engineer for subsequent submission to the Owner, complete Operation and Maintenance manuals in accordance with Section 01 78 23 for each of the installed systems.

B. The manuals shall consist of bound volumes instructing the Owner’s personnel in the use, operation, and maintenance of the system or piece of equipment to which the manual pertains. The manual shall include the items specified in Section 01 78 23 and in the specific Specification Section for the equipment or system. The manuals shall cover all phases of operation and maintenance and shall be illustrated with drawings, photographs, wiring diagrams etc. as necessary.

C. Each manual shall include two sets of final shop drawings depicting the equipment or system as installed.

END OF SECTION

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SECTION 26 05 19
CONDUCTORS AND CABLES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section encompasses the selection and installation of wire and cable for all types of applications.

B. Related Documents

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 26 01 00 - General Electrical Provisions.
3. Section 26 05 33 – Raceways and Boxes.
4. Section 26 05 53 - Electrical Identification.

1.02 REFERENCES

A. Federal Specifications (Fed. Spec.):

1. J-C-30A(1) Cable and Wire Electrical (Power, Fixed Installation).

B. Underwriters Laboratories, Inc. (UL) Publications:

1. No. 44 Rubber-Insulated Wire and Cables.
2. No. 83 Thermoplastic-Insulated Wires.
3. No. 493 Thermoplastic-Insulated Underground Feeder and Branch Circuit Cables.

1.03 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures in addition to the following requirements.

B. Comply with Section 26 01 00 - General Electrical Provisions.

C. Provide product data from the cable manufacturer.

1.04 DELIVERY AND STORAGE

A. Provide cable on original reels or in boxes, new and unused.

B. Store cables in dry protected area and protect cable ends in accordance with manufacturer’s recommendations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Low Voltage, Lighting and Power Cables:

1. Insulation system shall be type THHN, THWN or XHHW, 75ºC min., rated 600V as defined and listed in Article 310 of NEC.
2. Minimum size conductor utilized shall be #14 AWG for lighting circuits and #12 AWG for power circuits.
3. Acceptable manufacturers are Essex, General Cable, Southwire, Triangle, or equal.

B. Direct Burial Low Voltage, Lighting and Power Cables:

1. Electrical cable used for underground direct burial use shall have copper conductors and be Type UF as defined and listed in Article 339 Type UF of NEC.
2. Direct burial of cables shall be permitted only in areas where specifically approved by

the Engineer in writing.

3. Acceptable manufacturers are Essex, General Cable, Southwire, Triangle, or equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Lighting and Power Cables:

1. Install only after completion of work which might cause damage to wires or conduit.
2. Clean out or replace conduit in which dirt, water, concrete, or other foreign matter has been allowed to accumulate, before installing wiring.
3. Identification of Insulated Conductors: Mark on outer cover giving voltage, type, and size. In addition, identify each end of each conductor wire with marking tape or sleeve as described in Section 26 05 53 - Identification.
4. Splices:
   a. No wire splices allowed in entire length of conduit or raceway.
   b. Make splices in electrical enclosures.
   c. Splice Insulation: Equal to original factory insulation.
   d. Splicing Copper to Aluminum: Use aluminum-copper connections, approved as suitable for the purpose.
5. Termination of Conductors:
   a. Insulated type compression lugs, "Sta-Kon" type by Thomas & Betts.
   b. At distribution equipment containing aluminum bus bars use aluminum-copper lugs rated and approved for the application.
   c. For lighting and receptacle circuits use "Scotchlox Spring" connectors manufactured by 3M.

B. Lace or clip groups of feeder conductors at distribution centers, pullboxes, and wireways.

C. Use wire pulling lubricant listed by UL for pulling No. 4 AWG and larger wire. Do not pull cables through conduit with more than allowable bends specified in NEC 345-11.

D. Limit the number of conductors in boxes so that the maximum number does not exceed the number permitted by Tables 314.16(A) of the National Electrical Code.

E. Support conductors in vertical raceways in accordance with the National Electrical Code. Cable supports shall be O-Z/Gedney Type "R".

F. Shared neutral circuits shall not be used when circuits are supplying non-linear loads or have an isolated ground. These circuits shall have dedicated neutrals, except where the circuit is part of a connection to an office furniture modular wiring system.

END OF SECTION

SECTION 26 05 33
RACEWAY AND BOXES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

B. Raceways include the following:
   1. Rigid metal conduit.
   2. Intermediate metal conduit.
   3. Electrical metallic tubing (EMT).
   4. Flexible metal conduit.
   5. Liquidtight flexible conduit.
   6. Rigid nonmetallic conduit.
   7. Wireway.

C. Boxes, enclosures, and cabinets include the following:
   1. Device boxes.
   2. Outlet boxes.
   3. Pull and junction boxes.
   4. Cabinets and hinged cover enclosures.

D. Related Documents
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. Section 26 01 00 - General Electrical Provisions.
   3. Section 26 27 26 - Wiring Devices.
   4. Section 26 05 53 - Electrical Identification.

1.02 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures in addition to the following requirements.

B. Comply with Section 26 01 00 - General Electrical Provisions.

C. Product data for wireway and fittings, floor boxes, hinged cover enclosures, and cabinets.

D. Shop drawings for nonstandard boxes, enclosures, and cabinets. Include layout drawings showing components and wiring.

1.03 QUALITY ASSURANCE

A. Comply with NFPA 70 "National Electrical Code" for components and installation.

B. Listing and Labeling: Provide products specified in this Section that are listed and labeled.
   1. The Terms "Listed and Labeled": As defined in the "National Electrical Code," Article 100.

C. Comply with NECA "Standard of Installation."

D. Coordinate layout and installation of raceway and boxes with other construction elements to ensure adequate headroom, working clearance, and access.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering Products that may be incorporated in the Work include, but are not limited to, the following:

1. Metal Conduit and Tubing:
   a. Allied Tube and Conduit, Grinnell Co.
   b. Anamet, Inc., Anaconda Metal Hose.
   c. Anixter Brothers, Inc.
   d. Carol Cable Co., Inc.
   e. Cole-Flex Corp.
   f. Flexcon, Inc., Coleman Cable Systems, Inc.
   g. Spiraduct, Inc.
   h. Triangle PWC, Inc.
   i. Wheatland Tube Co.
2. Nonmetallic Tubing and Conduit:
   a. Anamet, Inc., Anaconda Metal Hose.
   b. Breeze-Illinois, Inc.
   c. Carlon.
   d. Certainteed Corp, Pipe & Plastics Group.
   e. Hubbell, Inc., Raco, Inc.
   f. Spiraduct, Inc.
   g. Thomas & Betts Corp.
3. Conduit Bodies and Fittings:
   a. Scott Fetzer Company, Adalet-PLM.
   b. American Electric, Construction Materials Group.
   c. Emerson Electric Co., Appleton Electric Co.
   d. Carlon.
   e. Hubbell, Inc., Killark Electric Manufacturing Co.
   f. General Signal, O-Z/Gedney Unit.
   g. Thomas and Betts Electrical Components Group.
4. Wireway:
   a. Hoffman Engineering Co.
   b. Keystone/Rees, Inc.
   c. Square D Co.
5. Boxes, Enclosures, and Cabinets:
   a. Scott Fetzer Company, Adalet-PLM.
   b. Butler Manufacturing Co., Walker Division.
   c. Cooper Industries, Midwest Electric.
   d. Erickson Electrical Equipment Co.
   e. Hoffman Engineering Co., Federal-Hoffman, Inc.
   f. Saginaw Control & Engineering
   g. Hubbell Inc., Killark Electric Manufacturing Co.
   h. General Signal, O-Z/Gedney.
   i. Raco, Inc., Hubbell Inc.
   j. Robroy Industries, Inc., Electrical Division.
   k. Square D Co.
   l. Thomas & Betts Corp.
   m. Quazite.

B. Metal Conduit and Tubing

1. Rigid Steel Conduit (GRC, RSC): ANSI C80.1.
2. Intermediate Metal Conduit (IMC): ANSI C80.6.
3. Electrical Metallic Tubing (EMT) and Fittings: ANSI C80.3 with steel set-screw or compression-type fittings.
4. Flexible Metal Conduit: Zinc-coated steel.
5. Liquidtight Flexible Metal Conduit: Flexible steel conduit with PVC jacket.
6. Fittings: NEMA FB 1, compatible with conduit/tubing materials.

C. Non-metallic Conduit and Tubing
   1. Electrical Nonmetallic Tubing (ENT): Not an acceptable raceway, shall not be used.
   2. Rigid Nonmetallic Conduit (RNC): NEMA TC 2, Schedule 40 or 80 PVC.
   3. PVC Conduit and Tubing Fittings: NEMA TC 3; match to conduit or conduit/tubing type and material.

D. Wireways
   1. Material: Sheet metal sized and shaped as indicated.
   2. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireway as required for complete system.
   3. Select features where not otherwise indicated, as required to complete wiring system and to comply with NEC.
   4. Finish: Manufacturer's standard enamel finish.

E. Outlet and Device Boxes
   1. Sheet Metal Boxes: NEMA OS 1.
   2. Cast Metal Boxes: NEMA FB 1, type FD, cast feralloy box with gasketed cover.
   3. Nonmetallic Boxes: NEMA OS 2.

F. Pull and Junction Boxes
   1. Small Sheet Metal Boxes: NEMA OS 1.
   2. Cast Metal Boxes: NEMA FB 1, cast aluminum with gasketed cover.
   3. In Ground Pull Box: Rated for the application.

G. Cabinets and Enclosures
   1. Hinged Cover Enclosures: NEMA 250, steel enclosure with continuous hinge cover and flush latch. Finish inside and out with manufacturer's standard enamel.
   2. Cabinets: NEMA 250, type 1, galvanized steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel. Hinged door in front cover with flush latch and concealed hinge. Key latch to match panelboards. Include metal barriers to separate wiring of different systems and voltage, and include accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures, and cabinets for compliance with installation tolerances and other conditions affecting performance of the raceway system. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 WIRING METHODS

A. Outdoors: Use the following wiring methods:
   1. Minimum conduit size to be 1".
   2. Exposed: Rigid or intermediate metal conduit.
   3. Concealed: Rigid or intermediate metal conduit.
   4. Underground, Single Run: Rigid nonmetallic conduit. (PVC).
   5. Underground, Grouped: Rigid nonmetallic conduit. (PVC)
   6. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Liquidtight flexible metal conduit.
   7. Boxes and Enclosures: NEMA Type 3R minimum.

B. Indoors: Use the following wiring methods:

1. Minimum conduit size to be 1/2".
2. Conduits for feeder conductors shall be GRC or IMC regardless of size.
3. Feeder raceway may be rigid nonmetallic conduit when installed below grade if installed with GRC or IMC elbow and stub-up through slab.
4. Conduits 1 1/4" diameter and smaller may be EMT where allowed by other paragraphs in this section.
5. Conduits 1 1/2" and greater shall be IMC or GRC except where flexible conduit is allowed by other paragraphs in this section.
6. Connection to Vibrating Equipment (including transformers and hydraulic, pneumatic, or electric solenoid or motor-driven equipment): Flexible metal conduit, except in wet or damp locations use liquidtight flexible metal conduit.
7. Damp or Wet Locations: PVC.
8. Underground:
   a. Conduits routed underground shall be rigid nonmetallic conduit with GRC or IMC elbow and GRC or IMC stub through slab.
9. Exposed:
   a. Below 8'-0" above finished floor: Rigid or intermediate metal conduit.
   b. Above 8'-0" above finished floor: Electrical metallic tubing.
10. Concealed in walls and above ceilings: Electrical metallic tubing.
11. Type MC cable and Romex is not permitted.
12. Conduit fittings:
    a. RMC and IMC shall have threaded fittings.
    b. EMT shall have steel compression fittings except steel set screw fittings will be accepted for ½" and ¾" raceways.
13. Boxes and Enclosures: NEMA Type 1.

C. For conduits that pass through exterior walls use environmental conduit seal type fittings.

3.03 INSTALLATION

A. Install raceways, boxes, enclosures, and cabinets as indicated, according to manufacturer's written instructions.

B. Use of plastic anchors must be pre-approved by project engineer.

C. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot water pipes. Install horizontal raceway runs above water and steam piping.

D. Install raceways level and square and at proper elevations. Provide adequate headroom.

E. Complete raceway installation before starting conductor installation.

F. Use temporary closures to prevent foreign matter from entering raceway.

G. Protect stub-ups from damage where conduits rise through floor slabs. Arrange so curved portion of bends is not visible above the finished slab.

H. Make bends and offsets so the inside diameter is not reduced. Unless otherwise indicated, keep the legs of a bend in the same plane and the straight legs of offsets parallel.

I. Use raceway fittings compatible with raceway and suitable for use and location. For intermediate steel conduit, use threaded rigid steel conduit fittings.

J. Install Linkseal on all underground conduits that enter a building space.

K. Run concealed raceways with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions, except as otherwise indicated.

L. Do not embed raceways slabs.

M. Install raceways parallel to or at right angles to nearby surfaces or structural members, and follow the surface contours as much as practical.

1. Run parallel or banked raceways together, on common supports where practical.
2. Make bends in parallel or banked runs from same center line to make bends parallel. Use factory elbows only where they can be installed parallel; otherwise, provide field bends for parallel raceways.

N. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.
2. Use insulating bushings to protect conductors.

O. Tighten set screws of threadless fittings with suitable tool.

P. Terminations: Where raceways are terminated with locknuts and bushings, align the raceway to enter square to the box and install two locknuts with dished part against the box.

Q. Where terminating in threaded hubs, screw the raceway or fitting tight into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align the raceway so the coupling is square to the box, and tighten the chase nipple so no threads are exposed.

R. Install pull wires in empty raceways. Use No. 14 AWG (1.6 mm) zinc-coated steel or monofilament plastic line having not less than 200-lb (90 kg) tensile strength. Leave not less than 12 inches (300 mm) of slack at each end of the pull wire.

S. Install raceway sealing fittings according to the manufacturer's written instructions. Locate fittings at suitable, approved, accessible locations and fill them with UL-listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points and elsewhere as indicated:

1. Where conduits pass from warm locations to cold locations, such as the boundaries of refrigerated spaces and air-conditioned spaces.
2. Where otherwise required by the National Electrical Code.

T. Stub-Up Connections: Extend conduits through concrete floor for connection to freestanding equipment with an adjustable top or coupling threaded inside for plugs, and set flush with the finished floor. Extend conductors to equipment with rigid steel conduit; flexible metal conduit may be used 6 inches (150 mm) above the floor. Where equipment connections are not made under this Contract, install screwdriver-operated threaded flush plugs flush with floor.

U. Flexible Connections: Use maximum of 6 feet (1830 mm) of flexible conduit for recessed and semi-recessed lighting fixtures; for equipment subject to vibration, noise transmission, or movement; and for all motors. Use liquid tight flexible conduit in wet or damp locations. Install separate ground conductor across flexible connections.

V. Install hinged cover enclosures and cabinets plumb. Support at each corner.

W. Provide grounding connections for raceway, boxes, and components as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque-tightening values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL Standard 486A.

3.04 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure that coatings, finishes, and cabinets are without damage or deterioration at Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touch-up coating recommended by the manufacturer.

3.05 CLEANING

A. Upon completion of installation of system, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finish, including chips, scratches, and abrasions.

END OF SECTION

SECTION 26 05 53
ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section provides the minimum requirements for the identification of the components of the electrical system.

B. Related Documents

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 26 01 00 - General Electrical Provisions.

1.02 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Nameplates shall be 1/8" 2-ply laminated with 1" high white letters on a black background.

B. Wire and cable markers shall be permanently attached cloth, split sleeve, or tubing type.

1. The identification shall be printed on the marker; write-on markers are not acceptable.
2. Include the branch circuit number, control circuit or any other appropriate identification that will expedite future tracing and trouble shooting.

C. Tape for wire color coding shall be thermo-plastic adhesive tape.

D. Underground warning tape shall be a detectable polyester with aluminum foil core and polyester under-laminate, 2" wide, warning marker labeled "BURIED ELECTRIC LINE" or similar; Brady 91601, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Identify switchboards, panelboards, enclosed circuit breakers, enclosed switches, motor starters, variable frequency drives, and other electrical enclosures using engraved laminated plastic nameplates, specified above, as follows:

1. Switchboards and panelboards with panel number.
2. Other enclosures with equipment and location being served.

B. Equip each distribution, lighting, and lighting control panel with a clear plastic covered typewritten directory accurately indicating rooms and/or equipment being serviced.

C. All electrical systems shall be color coded per National Electrical Code.

1.

	480Y/277 Volt Systems:	208Y/120 Volt Systems:
Phase A	Brown	Black
Phase B	Orange	Red
Phase C	Yellow	Blue
Neutral	Gray	White
Ground	Green with one yellow stripe	Green
Isolated Ground	Green with two yellow stripes	Green with one yellow stripe

2. Wire sizes #6 and smaller shall have color coded insulation the full length of the wire.

3. Wire size #4 and larger shall have color coded insulation the full length of the wire or be identified with the appropriate color tape at all switchboards, panelboards, junction boxes, motor terminals, and any other enclosure where phase identification is necessary.

D. Wires in each junction box, panelboard, disconnect, enclosure or outlet shall be labeled with wrap-on numbers according to the circuit number to which they are connected.

E. When wire of different systems junction in a common box, each cable shall be grouped with its own system and identified using tags or identification strips.

F. When a piece of equipment is fed from more than one electrical source or more than one disconnect switch must be off to completely disconnect the equipment provide signs at each disconnect warning of this hazard.

G. Identify all mechanical and electrical items with item, panel and circuit number.

H. Install arc flash warning labels at equipment if provided by the Engineer.

I. An underground warning marker shall be placed above buried cables and conduits the full length of the trench at a depth of 6" below grade.

J. Identify all non standard receptacles and multi-switch lighting controls as follows:
   1. Provide non-standard receptacles with engraved stainless steel plates identifying the equipment being served and the NEMA configuration of the device.
   2. Line voltage multi-switch lighting controls shall be labeled using engraved or stamped plates.
   3. Low voltage multi-switch lighting controls shall be labeled using factory provided label holders, or using stamped or engraved plates.

K. Identify all telecommunications cables, jacks, outlets, and components following the recommendations of BICSI and as per Section 27 10 00 of this specification.

END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section encompasses the selection and installation of circuit breaker panelboards, and their circuit breakers.

B. Related Documents

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 26 01 00 - General Electrical Provisions
3. Section 26 05 53 - Electrical Identification
4. Section 26 43 13 – Surge Protection Devices.

1.02 REFERENCES

A. National Fire Protection Association (NFPA) Publications:

1. No. 70 - National Electrical Code (NEC).

B. Underwriters' Laboratories, Inc. (UL) Publications:

1. No. 50 - Cabinet and Boxes, Electrical.
2. No. 67 - Panelboards.
3. No. 489 - Molded Case Circuit Breakers and Circuit Breaker Enclosures.
4. UL 891 - Dead Front Switchboards.

C. National Electrical Manufacturers Association (NEMA) Publications:

1. No. PB-1 - Panelboards.
2. NEMA PB 2: Deadfront Distribution Switchboards.
3. NEMA PB 2.1: Proper Handling, Installation, Operation, and Maintenance of Deadfront Switchboards rated 600V or Less.
4. No. AB-1 - Molded Case Circuit Breakers.

1.03 SUBMITTALS

A. Comply with Section 01 33 00 - Submittals and Substitutions in addition to the following requirements.

B. Shop drawings for panel.

C. Product data on circuit breakers.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General

1. Furnish and install distribution and power panelboards as shown on the plans. Panelboards shall be dead-front, safety type equipped with thermal magnetic, molded case bolt-on circuit breakers of frame and trip ratings as shown on the schedule. Provide Type 1, Class I, UL listed.
2. Panelboard bus structure and main lugs or main breaker shall have current ratings as shown on the drawings. Buses shall be rated to withstand a minimum of 110% of the maximum calculated available fault circuit current, but not less than 22,000 amperes symmetrical.

3. Panelboard assembly, including main breaker, shall be 80% rated unless otherwise noted. All sections and branch units shall be bussed directly to bus structure.
4. Phase, neutral and ground busses shall be copper.
5. Panelboards to be fully rated AIC.
6. Bussing for neutrals shall be 100% rated throughout unless indicated otherwise on the panel schedules.
7. All panelboards shall be completely factory assembled with molded case circuit breakers. Circuit breaker AIC rating shall not be lower than panelboard withstand rating. Series rating of main and branch circuit breakers is permitted as shown on drawings.
8. Provide mounting brackets, busbar drillings, filler pieces for unused spaces and ground bus.
9. Arrange buses for 3-phase wire distribution.
10. Ground Bus: Provide an un-insulated copper equipment ground bus bar.
11. Panelboards shall bear the UL label and conform to latest NEC requirements

B. Branch Circuit Panelboards:
1. Panelboard assembly shall be enclosed in a steel cabinet. The rigidity and gauge of steel is to be specified in UL Standard 50 for cabinets. The size of wiring gutters shall be in accordance with UL Standard 67. Recessed cabinets to be equipped with spring latch and tumbler lock on door of trim. Doors over 48" long shall be equipped with three-point latch and vault lock. All locks shall be keyed alike. End walls shall be removable. Fronts shall be of code gauge, full finished steel with rust-inhibiting primer and baked enamel finish.
2. Panelboards shall have branch circuits numbered vertically in two rows, (1, 3, 5 and 2, 4, 6, etc.). Branch runs shall be connected by circuit numbers indicated on drawings.
3. Minimum circuit trip rating shall be 20 amps for power and lighting.
4. Panelboards shall be comparable to Square D NQ or NF.

C. Circuit Breakers
1. Molded Case Circuit Breakers:
   a. Molded case circuit breakers shall have over-center, trip-free, toggle-type operating mechanism with quick-make/quick-break action and positive handle indication. Two- and three-pole breakers shall be common trip.
   b. Construction shall be of a rugged, integral housing type molded insulating material, with silver alloy contacts, arc quenchers and phase barriers for each pole.
   c. Each circuit breaker shall have a permanent trip unit containing individual non-adjustable thermal and magnetic trip elements in each pole with a common trip bar for all poles and a single operator. Circuit breaker operating handles shall assume a center position when tripped. All breakers shall be calibrated for operation in an ambient temperature of 40°C. Magnetic trip shall be adjustable from 3X to 10X for breakers with 400 ampere frames and higher. Factory setting shall be HI, unless otherwise noted.
   d. Main and feeder breakers for emergency systems shall have LSI electronic trip units for coordination.
   e. Breakers shall have removable lugs. Lugs shall be UL Listed for copper conductors. Breakers shall be UL Listed for installation of mechanical screw type lugs or crimp lugs.
   f. Circuit breakers in panelboards shall be bolt-on type on phase bus bar and shall have minimum interrupting rating exceeding calculated maximum available fault current by 10%. Series rating of main and branch circuit breakers is permitted as shown on drawings.

D. Acceptable manufacturers are Square-D, Eaton/Cutler Hammer, GE.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation shall be in accordance with National Electrical Code, as shown on the drawings, and as herein specified.

B. Emergency systems shall be selectively coordinated per NEC 700.27. A copy of the study shall be submitted to the Engineer and AHJ.

C. Follow manufacturer's installation instructions.

D. Properly ground switchboard per National Electrical Code and this specification.

E. All wiring terminations to be marked as to wire number or circuit number.

F. Flush mounted panel shall have tubs set into walls square with building lines and front panel, trim will match with tub and wall.

G. Provide a minimum of (4) spare ¾" conduits from panel tub to above accessible ceiling space for each recessed panel.

H. All panels shall be mounted at a 6'-6" maximum height above finished floor to the top of the enclosure.

I. Properly mount circuit breakers so that acceptable electrical connection is made to bus work.

J. Each panel shall be provided with a neatly typewritten directory identifying its circuit connections. Panel identification and directories shall comply with Section 26 05 53 of this specification.

END OF SECTION

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SECTION 26 27 26
WIRING DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section encompasses the selection and installation of wiring devices to include:
   1. Line Voltage Wall Switches
   2. Dimmer Switches
   3. Receptacles
   4. Push Buttons & Selector Switches
   5. Cover Plates
   6. Clock receptacles and Clocks

B. Related Documents
   1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
   2. Section 26 01 00 - General Electrical Provisions.
   3. Section 26 05 53 - Electrical Identification.

1.02 REFERENCES

A. Underwriters Laboratories Inc. (UL) Publications:
   1. UL-20 Underwriter's Laboratories General Use Snap Switches.

B. National Electrical Manufacturers Association (NEMA) Publications:
   1. WD 1 General Purpose Wiring Devices: National Electrical Manufacturers Association Standards (NEMA).

C. American National Standard Institute (ANSI):
   1. C 73 Series American National Standard Institute (ANSI) American Standards on Plugs and Receptacles.

1.03 SUBMITTALS

A. Comply with Section 01 33 00 - Submittal Procedures in addition to the following requirements.

B. Product data of all types of items supplied.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Wall Switches
   1. Lighting and other flush switches shall be specification grade, quiet operating, toggle type in totally enclosed base of the following make and catalog number or approved equal:
      a. Single Pole 20 amp 120/277V Hubbell No. 1221
      b. Two Pole 20 amp 120/277V Hubbell No. 1222
      c. Three Way 20 amp 120/277V Hubbell No. 1223
      d. Four Way 20 amp 120/277V Hubbell No. 1224
   2. Color shall be white.

3. Reference to Hubbell devices has been used as a means of establishing the grades and types of devices for use on the project. Comparable devices of Bryant, Leviton, or Pass & Seymour, Inc. will be acceptable.

B. Receptacles:

1. Standard Duplex Receptacle: Full gang size, specification grade, polarized, duplex, parallel blade, grounding slot, rated at 20 amperes, 120 volts, to conform to NEMA WD-1. Receptacles shall be similar to those as manufactured by Hubbell (No. 5362) or equivalent devices by Bryant, Leviton, or Pass & Seymour, Inc.
2. Ground fault receptacle: UL listed Class A with 5 milli-ampere sensitivity 20 ampere 120 VAC rating grounded NEMA 5-20R. Manufactured by Bryant, Leviton, Hubbell, Pass & Seymour, Inc., or equal.
3. TVSS receptacle UL listed to standards 1449 and 498. Receptacle shall be similar to those as manufactured by Hubbell (No. 5262S) or equivalent devices by Bryant, Leviton, or Pass & Seymour, Inc.
4. Color of devices shall be white.

C. Cover Plates: Provide for standard switches and receptacles.

1. Material:
   a. Plastic, non-combustible, mar-proof thermosetting material, minimum 0.100" thick.
   b. Gaskets: Resilient rubber or closed cell foam urethane.
2. Type Application:
   a. Flush Mounting Plates: Nylon in all living and office areas, stainless steel in all others.
   b. Surface Box Plates: Beveled, steel, pressure formed for smooth edge to fit box.
   c. Weatherproof Covers: Cast aluminum, high impact nonmetallic, gasketed for in-use covers.
3. Acceptable manufacturers are Hubbell, Crouse-Hinds, Bryant, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All wiring devices shall be of one manufacturer and shall be delivered to project in original cartons. Devices shall be in accordance with Electrical Symbol Legend.

B. Mounting heights shall be as specified on the drawings.

C. Coordinate switch mounting location with architectural detail.

D. Standard duplex receptacles shall be oriented with the ground opening on the bottom.

E. Receptacles indicated with GFCI on the drawings are to be GFCI receptacles. GFCI protection of standard receptacles through GFCI circuit breakers is not permitted unless noted otherwise.

F. The outdoor units to be enclosed in cast aluminum boxes with weatherproof in-use covers.

G. Provide engraved nameplate for receptacle other than standard duplex receptacle.

H. Device plates of the one-piece type shall be provided for all outlets to suit the devices installed; do not use sectional type device plates. Screws shall be of metal with countersunk heads, in color to match the finish of the plates. Screws shall be vertically aligned. Install plates with all four edges in continuous contact with finished wall surfaces without the use of mats or similar devices; plaster filling will not be permitted.

END OF SECTION

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SECTION 26 28 16
DISCONNECT SWITCHES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section encompasses all motor and general circuit disconnects including separately mounted disconnects and those mounted in motor control centers, panelboards and switchboards.

B. Related Documents

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 26 01 00 - General Electrical Provisions
3. Section 26 28 13 - Fuses

1.02 REFERENCES

A. Underwriters Laboratories Inc. (UL):
No. 98 - Enclosed Switches.

B. National Fire Protection Association (NFPA):
No. 70 - National Electrical Code (NEC).

C. National Electrical Manufacturers Association (NEMA):
No. KS 1 - Enclosed Switches.

1.03 SUBMITTALS

A. Comply with Section 01 33 00 - Submittals and Substitutions in addition to the following requirements.

B. Provide shop drawings for approval for all disconnects switches that are not included with equipment, including outline and mounting dimensions, wiring schematic diagrams and withstandability ratings.

C. Provide product data for approval for all disconnects not an integral part of equipment.

D. Provide typical test report data for all disconnects outlined above.

E. Provide manuals for operation and maintenance data including renewal parts for all disconnects.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Disconnect Switches:

1. The disconnect switches shall be safety type, NEMA type HD, UL listed, lockable, with quick-make, quick-break operating handle, and mechanism forming an integral part of the box, not in the cover. The switches to have dual cover interlock to prevent unauthorized opening of door in the "ON" position or closing mechanism with door open. Handle position shall indicate if switch is ON or OFF. Switches shall have removable arc suppressors, where necessary to permit easy access to line-side lugs. Lugs shall be UL listed for aluminum and/or copper cables and front removable. All current carrying parts shall be plated.
2. In outdoor locations, the disconnect switch enclosures and operators shall be NEMA 3R.

3. Provide fusible disconnect switches with clips for fuses which have adequate interrupting capacity for the application and have an adequate short circuit current withstand rating to meet or exceed the available short circuit current.
4. Disconnect switches shall be provided with lugs suitable for the conductors used.
5. Acceptable manufacturers are Square-D, Eaton, General Electric, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install motor and circuit disconnects in accordance with manufacturers recommendations and applicable codes.

B. Disconnect switches for single phase motors rated 1 HP and less may be a snap switch type general use switch if it is provided with a means for locking the switch in the open position.

C. Disconnect switches for motors 1-1/2 HP and larger shall be heavy duty switches similar to Square "D" Type H heavy duty line.

END OF SECTION

SECTION 26 28 18
CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section encompasses the selection and installation of circuit breakers in their related enclosures.

B. Related Documents

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 26 01 00: General Electrical Provisions.
3. Section 26 24 19: Motor Starters.
4. Section 25 24 16: Panelboards.

1.02 REFERENCES

A. National Fire Protection Association (NFPA) Publications:
No. 70 National Electrical Code (NEC).

B. National Electrical Manufacturers Association (NEMA) Publications:
No. AB-1 Molded Case Circuit Breakers.

C. Underwriters Laboratories, Inc. (UL) Publications:
No. 489 Molded Case Circuit Breakers and Circuit Breakers Enclosures.

1.03 SUBMITTALS

A. Comply with Section 01 33 00 - Submittals and Substitutions in addition to the following requirements.

B. Product data including applicable shop drawings.

C. Coordination and characteristic curves for circuit breakers.

D. Test reports.

PART 2 - PRODUCTS

2.01 EQUIPMENT

A. Molded Case Circuit Breakers:

1. Molded case circuit breakers shall have over-center, trip-free, toggle-type operating mechanism with quick-make/quick-break action and positive handle indication. Two- and three-pole breakers shall be common trip.
2. Construction shall be of a rugged, integral housing type molded insulating material, with silver alloy contacts, arc quenchers and phase barriers for each pole.
3. Each circuit breaker shall have a permanent trip unit containing individual non-adjustable thermal and magnetic trip elements in each pole with a common trip bar for all poles and a single operator. Circuit breaker operating handles shall assume a center position when tripped. All breakers shall be calibrated for operation in an ambient temperature of 40°C. Magnetic trip shall be adjustable from 3X to 10X for breakers with 400 ampere frames and higher. Factory setting shall be HI, unless otherwise noted.
4. Breakers shall have removable lugs. Lugs shall be UL Listed for copper conductors. Breakers shall be UL Listed for installation of mechanical screw type lugs or crimp lugs.

5. Circuit breakers in panelboards shall be bolt-on type on phase bus bar and shall have minimum interrupting rating as follows:
   a. 120 volt breakers: 10,000 amperes symmetrical.
   b. 208 and 240 volt breakers: 22,000 amperes symmetrical.
6. Provide ground fault interrupters with 4-6 ma sensitivity.
7. For circuit breakers being added to existing panelboards, coordinate the breaker type with existing panelboards. Modify the panel directory.

B. Acceptable manufacturers are: Square-D, General Electric, Eaton, Siemens, or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Circuit breakers to be mounted in enclosures, or panels.

B. Breakers shall have permanently installed lockout devices.

C. Enclosure for circuit breaker shall be properly grounded.

D. Attach handles so as not to interfere with cover plate or door.

E. Properly mount circuit breaker so that acceptable electrical connection is made to bus work.

F. Termination of breaker terminals shall be to industry standards.

G. Installation shall be in accordance with National Electrical Code, as shown on the Drawings, and as herein specified.

H. Balance the load on all phases and rearrange branch circuiting if required, for balancing.

END OF SECTION

SECTION 26 50 00
LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes interior, exterior, and site lighting fixtures, lamps, ballasts, LED's, drivers, emergency lighting units, and accessories.

B. Related Documents

1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these Specifications.
2. Section 26 01 00 - General Electrical Provisions

1.02 DEFINITIONS

A. Emergency Lighting Unit: A fixture with integral emergency battery-powered supply and the means for controlling and charging the battery. It is also known as an emergency light set.

B. Fixture: A complete lighting unit, exit sign, or emergency lighting unit. Fixtures include lamps and parts required to distribute light, position and protect lamps, and connect lamps to power supply. Internal battery-powered exit signs and emergency lighting units also include a battery and the means for controlling and recharging the battery. Emergency lighting units include ones with and without integral lamp heads with remote capability to power an exterior emergency fixture.

C. Average Life: The time after which 50 percent fails and 50 percent survives under normal conditions.

1.03 SUBMITTALS

A. Comply with Section 01 33 00 - Submittals and Substitutions in addition to the following requirements.

B. Product Data describing fixtures, lamps, ballasts, and emergency lighting units. Arrange Product Data for fixtures in order of fixture designation. Include data on features and accessories and the following:

1. Outline drawings indicating dimensions and principal features of fixtures.
2. Electrical Ratings and Photometric Data: Certified results of independent laboratory tests for fixtures and lamps.
3. Battery and charger data for emergency lighting units.

C. Shop Drawings detailing nonstandard fixtures and indicating dimensions, weights, method of field assembly, components, features, and accessories.

D. Wiring diagrams detailing wiring for control system showing both factory-installed and field-installed wiring for specific system of this Project, and differentiating between factory-installed and field-installed wiring.

1.04 QUALITY ASSURANCE

A. Electrical Component Standard: Provide components that comply with NFPA 70 and that are listed and labeled by UL where available.

B. Listing and Labeling: Provide fixtures, emergency lighting units, and accessory components specified in this Section that are listed and labeled for their indicated use and installation conditions on Project.

1. Special Listing and Labeling: Provide fixtures for use in damp or wet locations, and recessed in combustible construction that are specifically listed and labeled for such use.

2. The Terms "Listed" and "Labeled": As defined in the National Electrical Code, Article 100.

3. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.

C. Coordinate fixtures, mounting hardware, and trim with ceiling system and other items, including work of other trades, required to be mounted on ceiling or in ceiling space.

1.05 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Manufacturer's Warranty: Shall be submitted within closeout documents.

C. Special Warranty for Batteries: Submit a written warranty executed by the manufacturer agreeing to replace rechargeable system batteries that fail in materials or workmanship within the specified warranty period.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, fixtures that may be incorporated into the Work include, but are not limited to, the products specified in the Light Fixture Schedule.

2.02 FIXTURES AND FIXTURE COMPONENTS

A. Metal Parts: Free from burrs, sharp corners, and edges.

B. Sheet Metal Components: Steel, except as indicated. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit re-lamping without use of tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent accidental falling during re-lamping and when secured in operating position.

D. Reflecting Surfaces: Minimum reflectance as follows, except as otherwise indicated:

1. White Surfaces: 85 percent.

2. Specular Surfaces: 83 percent.

3. Diffusing Specular Surfaces: 75 percent.

4. Laminated Silver Metallized Film: 90 percent.

E. Lenses, Diffusers, Covers, and Globes: 100 percent virgin acrylic plastic or water white, annealed crystal glass, except as otherwise indicated.

1. Plastic: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

2. Lens Thickness: 0.125 inch (3 mm) minimum; except where greater thickness is indicated.

3. Fluorescent Fixtures: Conform to UL 1570.

F. Drivers for LED Fixtures:

1. Electronic Driver for LED Fixtures: Comply with UL 1310 Class 2 requirements for dry and damp locations. EMI compliance with FCC Part 15 Class A. Include the following features unless otherwise indicated:

2. Rated for 50,000 hours of life, unless otherwise noted.

3. Type: Constant current
4. Sound Rating: Class A.
5. Total Harmonic Distortion Rating: 20 percent or less.
6. Power factor at full load: >0.90
7. Efficiency at full load: >85%
8. Input Voltage: 120V - 277V (+/- 10%)
9. Frequency Range: 50 – 60 Hz (+/- 10%)
10. Transient Protection: NEMA SSL – 2010, Non-Roadway 2.5KV
11. Over voltage and load protection: Yes, non-latching
12. Ambient Operating Temperature: -30C to 50C
13. Dimming Control: 0-10V (isolated)
14. Dimming Range: 10% - 100%
15. Source/Sink Current: 1mA max.

G. LED Fixtures:
1. Except as otherwise indicated, provide LED luminaires, of types and sizes indicated on fixture schedules.
2. Include the following features unless otherwise indicated:
3. Each Luminaire shall consist of an assembly that utilizes edge-lit LEDs as the light source. In addition, a complete luminaire shall consist of a housing, LED array, and electronic driver (power supply).
4. Luminaire optics shall consist of precision formed optical assembly with positively retained high grade acrylic lenses using laser precise micro-prism patterns to provide directional distribution
5. Each luminaire shall be rated for a minimum operational life of 100,000 hours utilizing a maximum ambient temperature of (25°C).
6. Light Emitting Diodes tested under LM-80 Standards for a minimum of 10,000 hours.
7. Color Rendering Index (CRI) of 82 at a minimum.
8. Color temperature 5000 K, unless otherwise indicated.
9. Rated lumen maintenance at 92% lumen output for 100,000 hours, unless otherwise indicated.
10. Fixture efficacy of 115 Lumens/Watt, minimum
11. Fixture depth shall be no greater than 3.25”
12. 5 year luminaire warranty, minimum.
13. Photometry must comply with IESNA LM-79.
14. The individual LEDs shall be constructed such that a catastrophic loss of the failure of one LED will not result in the loss of the entire luminaire.
15. Luminaire shall be constructed such that driver may be replaced or repaired without the replacement of the whole fixture.

H. Technical Requirements:
1. The luminaire shall not consume power in the off state.
2. Operation Voltage: The luminaire shall operate from a 50 HZ to 60 HZ AC line over a voltage ranging from 120 VAC to 277 VAC. The fluctuations of line voltage shall have no visible effect on the luminous output.
3. Power Factor: The luminaire shall have a power factor of 0.9 or greater.
4. THD: Total harmonic distortion (current and voltage) induced into an AC power line by a luminaire shall not exceed 20 percent.
5. Operational Performance: The LED circuitry shall prevent visible flicker to the unaided eye over the voltage range specified above.

I. Thermal Management:

1. The thermal management (of the heat generated by the LEDs) shall be of sufficient capacity to assure proper operation of the luminaire over the expected useful life.
2. The LED manufacturer's maximum thermal pad temperature for the expected life shall not be exceeded.
3. Thermal management shall be passive by design. The use of fans or other mechanical devices shall not be allowed.
4. The luminaire shall have a minimum heat sink surface such that LED manufacturer's maximum junction temperature is not exceeded at maximum rated ambient temperature.

J. Exit Signs: Conform to UL 924 and the following:

1. Sign Colors: Refer to Luminaire Schedule on drawings.
2. Arrows: Include as indicated.
3. Lamps for AC Operation: Light-emitting diodes (LED), 70,000 hours minimum rated life.

K. Self-Powered Exit Signs (Battery Type): Integral automatic high/low trickle charger in a self-contained power pack.

1. Battery: Sealed, maintenance-free, 90 minute minimum running time, nickel-cadmium type with special warranty.

2.03 LAMPS

A. Comply with ANSI C78 series that is applicable to each type of lamp.

B. Fluorescent Color Temperature and Minimum Color-Rendering Index (CRI): 3500 K and 85 CRI, except as otherwise indicated.

C. Non-compact Fluorescent Lamp Life: Rated average is 20,000 hours at 3 hours per start when used on rapid start circuits.

D. Metal Halide as specified in Luminaire Schedule on drawings.

2.04 FINISHES

A. Manufacturer's standard, except as otherwise indicated, applied over corrosion-resistant treatment or primer, free of streaks, runs, holidays, stains, blisters, and similar defects.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Set units plumb, square, and level with ceiling and walls, and secure according to manufacturer's written instructions and approved Shop Drawings.

B. Support for Recessed and Semi-recessed Grid-Type Fluorescent Fixtures: Units may not be supported from suspended ceiling support system. Install ceiling support system rods or wires at a minimum of 4 rods or wires for each fixture, located not more than 6 inches (150 mm) from fixture corners.

1. Install support clips for recessed fixtures, securely fastened to ceiling grid members, at or near each fixture corner.
2. Fixtures Smaller than Ceiling Grid: Install a minimum of 4 rods or wires for each fixture and locate at corner of ceiling grid where fixture is located. Do not support fixtures by ceiling acoustical panels.
3. Fixtures of Sizes Less than Ceiling Grid: Center in acoustical panel except where located along walls that are oriented at a different angle than the ceiling grid. In this case, position light fixtures in a line parallel to the wall. Support fixtures independently

with at least two 3/4-inch (20-mm) metal channels spanning and secured to ceiling tees.

C. Lamping:

1. Where specific lamp designations are not indicated, lamp units according to manufacturer's instructions.

3.02 CONNECTIONS

A. Ground lighting units. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.03 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Give advance notice of dates and times for field tests.

C. Provide instruments to make and record test results.

D. Tests: Verify normal operation of each fixture after fixtures have been installed and circuits have been energized with normal power source. Interrupt electrical energy to demonstrate proper operation of emergency lighting installation. Include the following information in tests of emergency lighting equipment:

1. Duration of supply.
2. Low battery voltage shutdown.
3. Normal transfer to battery source and retransfer to normal.
4. Low supply voltage transfer.

E. Replace or repair malfunctioning fixtures and components, then retest. Repeat procedure until all units operate properly.

F. Report results of tests.

G. Replace fixtures that show evidence of corrosion during Project warranty period.

3.04 ADJUSTING AND CLEANING

A. Clean fixtures after installation. Use methods and materials recommended by manufacturer.

B. Allow for three separate sessions with architect, engineer and owner's representative to adjust exterior floodlight fixtures.

END OF SECTION

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SECTION 31 00 00
EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Work under this section includes all labor, materials, equipment, and services necessary to complete the earthwork as shown on the drawings and herein specified.
2. Stripping and stockpiling topsoil.
3. Rough grading.
4. Proof-rolling of stripped sub-grades.
5. Excavating, filling, compacting, and grading sub-grade, sub-base, and base course for building foundation and footing, floor slab, sidewalks, yard slabs, and pavement.
6. Disposal of excavated materials not required for fills.
7. Dewatering of excavations for building foundation and footing, floor slab, sidewalks, yard slabs, and pavement.
8. Drainage of all areas of the Work to prevent standing water and erosion of excavations for building foundation and footing, floor slab, sidewalks, yard slabs, and pavement.
9. Protection of excavations for building foundation and footing, floor slab, sidewalks, yard slabs, and pavement.
10. Furnishing and placing select fill and backfill materials.
11. Topsoil placement and finish grading for landscaping.
12. Providing temporary haul roads and erosion controls.
13. Restoration.

B. Related Sections:

1. Section 02 30 00 - Subsurface Investigations
2. Section 31 25 00 - Erosion and Sedimentation Control
3. Section 31 23 16 - Trenching

1.02 REFERENCES

A. ASTM International, ASTM C 136-2001 “Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.”

B. ASTM International, ASTM D1557-2002 “Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.”

C. ASTM International, ASTM D2487-2000 “Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).”

D. ASTM International, ASTM D2922-2001 “Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).”

E. ASTM International, ASTM D3017-2001 “Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).”

1.03 DEFINITIONS

A. Influence Zone Under Footings: Foundations, Pavements, Floor Slabs, Yard Slabs, or Sidewalks: Area below sub-base bounded by a one horizontal to two vertical slope extending outward from one foot beyond outer edges.

B. Influence Zone Around Piping, Electrical, and Ducts: Area below limits bounded by horizontal line 12 inches above pipe, conduit, or duct and by one horizontal to two vertical

slope extending downward from that line one foot beyond outer edge of pipe, conduit, or duct.

1.04 SUBMITTALS

A. General: Submittals shall be made in accordance with Section 01 33 00 Submittal Procedures.

B. Quality Control Submittals:

1. Test Reports: Submit three copies of compaction test reports for existing in-place soils and controlled fill, laboratory test reports, and field footing sub-grade evaluation reports.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements

1. Conform to requirements of local, state, and federal rules and regulations applicable to work and project location.
2. Where provisions of pertinent regulations, codes, and standards conflict with this specification, the more stringent provisions shall govern.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Storage and Protection

1. Use all means necessary to protect all materials of this section before, during, and after installation and to protect all objects designated to remain.
2. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Design Professional at no additional cost to the Owner.
3. Use all means necessary to protect all existing utilities, roads, and all other site improvements that are to remain.

1.07 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

1. All erosion control methods shall comply with Wisconsin Construction Site Management Handbook as published by the Department of Natural Resources.
2. Dust Control:
   a. Use all means necessary to control dust on and near the Work and on and near all site borrow areas if such dust is caused by the Contractor's operations during performance of the Work or if resulting from the condition in which the Contractor leaves the site.
   b. Thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other Work on the site.

B. Existing Conditions:

1. Where existing sewers, water, electric or other services are encountered, Contractor shall take adequate steps to protect such services.
2. If such existing services require relocation, make written request for ruling from the Architect/Engineer. Do not proceed on such portions of Work until written instructions are received. Costs involved shall be negotiated.
3. Information Based on Preliminary Investigations:
   a. Information pertaining to preliminary investigations, such as test borings, location of utilities, and existing grades has been collected for the Project and will be available for review by bidders. There is no expressed or implied guarantee that conditions so indicated are entirely representative or those actually existing or that unforeseen developments may not occur. The interpretation of results of such investigation shall not be the responsibility of the Architect/Engineer. The Contractor shall visit the Site and make his own

interpretation of conditions, based on his investigation of existing conditions and on soil reports. Where underground services, utilities, etc., are located on the Drawings or given at the Site, they are based on available records, but are not guaranteed to be complete or correct. They are merely available for assistance.

C. Protection:

1. Use all means necessary to protect all materials of this section before, during, and after installation and to protect all objects designated to remain.
2. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer at no additional cost to the Owner.
3. Use all means necessary to protect all existing utilities, roads, and all other site improvements that are to remain.

1.08 SEQUENCING AND SCHEDULING

A. Sequence and schedule activities so that work will progress in a timely manner. Contractor shall schedule and sequence work with all Contractors on the Project.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Fill and Usage:

1. Approval is required by geotechnical engineer in writing to the Architect/Engineer.
2. Composition: Bank run gravel conforming to Wisconsin Department of Transportation Specification Section 313.
3. Classification
   a. Floor Slabs, Footings, and Aprons at Building:
      i. 100 percent passing screen having nominal square opening size of 3”.
      ii. Not more than 30% retained on 3/4" sieve.
      iii. Not more than 46% passing No. 100 sieve.
      iv. Raising Site Grades: Not more than 12% passing No. 200 sieve.
      v. Final Eight Inches of Fill Material: Not more than 5% passing No. 200 sieve.
      vi. Sieve analysis report shall be completed and submitted prior to placement. Separate sieve analyses shall be performed if fill is supplied by multiple suppliers.
   b. Exterior Concrete Yard Slabs and Walks:
      i. Raising Site Grades: Silty Clay with moisture content of 2 to 3 percent of optimum moisture content. Lifts not to exceed 6" in loose thickness and compacted with sheepsfoot type roller. Minimum compaction 95%.
      ii. Final Eight Inches of Fill Material: Not more than 5% passing No. 200 sieve.
   c. Paved Areas and Concrete Aprons at Roads:
      i. Raising Site Grades: Silty Clay with moisture content of 2 to 3 percent of optimum moisture content. Lifts not to exceed 6" in loose thickness and compacted with sheepsfoot type roller. Minimum compaction 95%.
      ii. Final Inches of Fill Material: Not more than 5% passing No. 200 sieve.

B. Earth Fill:

1. On-site subsoil or borrow free from organic material and other deleterious substance and rocks or lumps over six inches in greatest dimension, and not more than 15% of the rocks or lumps shall be larger than 2 1/2 inches in greatest dimension. Satisfactory materials are defined as those meeting ASTM D2487 Soil Classification

Groups GW, GP, GM, GC, SW, SP, SM, SC, and CL.

a. Unsuitable Material: Soil Classification Groups ML, OL, MH, CH, OH and PT according to ASTM D2487.

C. Topsoil Fill: On-site topsoil. Use excess topsoil for landscaping and filling in turf areas.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Notify corporations, companies, individuals, or authorities owning above or below ground conduits, wires, pipes, or other utilities running to property or encountered during excavation operations. Cap or remove and relocate services as required.

3.02 PREPARATION

A. Protection: Protect, support, maintain conduits, wires, pipes, or other utilities that are to remain in accordance with the requirements of owners of said services.

B. Surface Preparation:

1. Layout of Work:

a. Layout site earthwork.

b. Establish sitework elevations.

3.03 CLEARING AND GRUBBING

A. Accept the site as found and remove all trash, rubbish, and other debris.

B. Remove all trees, saplings, bushes, vines, and undergrowth within the Contract Limits as required for execution of construction except for planning to remain or removed by others as indicated on the Drawings.

C. Remove all stumps, roots, and matted roots 12” below the bottom of the base course.

D. Remove the material from the site. Burning of materials on-site is not permitted.

3.04 STRIPPING AND STOCKPILING TOPSOIL

A. Remove topsoil and unsuitable material to its entire depth from areas to be occupied by buildings and paving, and from areas to have change in grade.

B. Stockpile topsoil in a designated or approved location. Remove excess topsoil from the site.

3.05 PROOF ROLLING OF STRIPPED SUB-GRADES

A. Proof roll subgrades under building areas, walk areas, and areas to be paved in the presence of the geotechnical engineer. Proof roll after stripping to sub-grade and immediately prior to placing fill material.

B. Proof roll with at least two passes performed in a crisscross pattern with a fully loaded tri-axle dump truck with a minimum gross weight of 30 tons, or equivalent acceptable to the Design Professional.

1. Adjust as necessary for proper weather conditions.

C. Remove soft, loose, weak, and unstable or unsuitable soils and replace with approved compacted fill materials and re-compact.

3.06 EXCAVATING

A. Excavate to elevations and dimensions necessary to complete construction.

B. Remove unsuitable material as determined by Geotechnical Engineer.

C. Remove excess material from Site.

3.07 PLACING FILL

A. Place structural fill in accordance with structural fill classifications.

B. Notify Owner and Soils Testing Agency before placing fill material.

C. Do not use wet or frozen material or place fill on wet, unstable or frozen sub-grade.

D. Fill excavations below bottom of foundation or footing elevations within influence zone with concrete or structural fill.

E. Do not backfill until new concrete has been properly cured and required tests have been accepted.

F. Place fill simultaneously on both sides of free-standing structures.

G. Fill adjacent to structure, footings, and foundation walls shall be structural fill.

H. Place fill against foundation walls enclosing interior spaces only after construction is in place to brace the top of the wall.

I. To minimize lateral forces against structure due to wedging action of soil, begin compaction of each layer at structure wall.

J. Provide mechanical compaction for cohesive materials and vibratory compaction for granular materials. Compaction by travel of grading equipment shall not be considered adequate for uniform compaction.

K. Provide hand guided vibratory or tamping compactors whenever fill is to be placed in confined areas.

L. Lift Thickness: Place materials uniformly in layers not to exceed 6 inches in depth, measured loose, for cohesive soils; and in layers not to exceed 8 inches in depth, measured loose for granular materials.

M. Compact to the percent of maximum dry density listed in the following schedule in accordance with ASTM D 1557.

Compaction Schedule Location	Minimum Percent Compaction
Footing or Foundation Slab Influence Zone & Adjacent to Foundations	95
Floor Slab, Pavements, Subgrade Pipe Influence Zones; Walks, aprons, and stoops	95

Compaction Schedule Location	Maximum Percent Compaction
Lawns and Landscape Areas	80

N. Compact sub-grade to degree required for subsequent fill.

O. Moisture Content of Fill: Within 3% of optimum when placed and compacted. For silty clay see paragraph 2.01.A.3. b. & c in this Section.

P. Testing Requirements:

1. Contractor shall provide testing.
2. Geotechnical Engineer shall check all foundation subgrades to verify bearing capacities and settlement characteristics of foundation soils prior to the construction of foundations.

Q. Test Frequency:

1. Test sub-grade and fill to check bearing capacity or densities as follows:
   a. At each layer of compacted fill, one test for every 5,000 sq. ft., for areas other than backfill at foundation wall.
   b. At sub-grade of each individual pad footing.
   c. At sub-grade for continuous footings at 50 ft. center to center.

d. At each layer of compacted fill for foundations, floor slabs, pavements, utility trenches, walks, aprons, and step sub-grade.

e. At each layer of compacted backfill for foundation walls, and adjacent to foundations, test locations not to exceed 50 ft. center to center.

2. Test performed on successive layers of fill shall be made at alternating and remote locations from each other to provide a representative profile of the section or area being constructed.

R. Rough Grading Tolerances:

1. Granular cushion: Plus or minus 0.1 ft.

2. All backfill: Plus or minus 0.1 ft.

3.08 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.

B. Revise testing in paragraph below to suit Project or delete if not applicable.

C. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.

D. Revise paragraph below to suit Project or delete if not applicable. If retaining, add other field tests, such as California bearing ratio of subgrades, subbases, and bases for paving, if required.

E. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

F. 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. Tests will be performed at the following locations and frequencies:

1. Frequencies of testing in subparagraphs below are examples only; revise to suit Project.

2. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least 1 test for every 2,000 sf or less of paved area or building slab, but in no case fewer than 3 tests.

3. Foundation Wall Backfill: At each compacted backfill layer, at least 1 test for each 100 feet or less of wall length, but no fewer than 2 tests.

4. Trench Backfill: At each compacted initial and final backfill layer, at least 1 test for each 150 feet or less of trench length, but no fewer than 2 tests.

G. Submit test reports. Testing reports shall include test results along with either a verbal description of the locations where the tests were taken or a plan with those locations marked.

H. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.09 DRAINAGE

A. All building material waste shall be properly managed and disposed to prevent pollutants and debris from being carried off the site.

B. Grade around the building so that ground is pitched to prevent water from running into excavated areas and damaging structures.

C. Maintain all excavations and trenches where footings are to be placed, free of water at all times.

D. Provide all pumping required to keep excavated areas clear of water during construction.
   1. Use geotextile bag and discharge to appropriate location on site to prevent erosion
      a. Maximum apparent opening size: ASTM D-4751, 0.212 mm
      b. Grab Tensile Strength: ASTM D-4632, 300 lbs.
      c. Mullen Burst: ASTM D-3786, 580 psi
      d. Permeability: ASTM D-4491, 0.2 cm/sec
      e. Fabric: Nominal Representative Weight, 12 oz.
   2. Geotextile bags shall be securely attached to discharge pipe
   3. Discharge shall be directed to either a sediment trap or sediment basin

3.10 RIPRAP

A. Provide light riprap in accordance with Wisconsin DOT Standard Specifications 606 'Rip Rap' latest edition.

B. Rip rap at all storm pipe outlets to the bottom of slopes 4:1 or steeper at a minimum 4'-0" wide. Unless specified otherwise, riprap shall be at least 1'-0" thick, measured perpendicular to the slope.

C. Provide geotextile fabric under rip rap.

3.11 SHEETING AND SHORING

A. All excavation of every description and of whatever substances encountered shall be performed to the depths indicated or otherwise specified. During excavation, material suitable for backfilling shall be piled in an orderly manner in a sufficient distance from the banks of the trench or pit to avoid overloading and to prevent slides or cave-ins. Sheeting and shoring shall be placed as may be necessary for the protection of the Work and for the safety of personnel.

3.12 PLACEMENT OF TOPSOIL

A. Prior to spreading topsoil, scarifying the sub-grade to a depth of two inches to promote the bonding of the topsoil to the subsoil.

B. Spread and compact topsoil to a uniform depth of eight inches in all landscaped areas and other areas stripped, but no paved or otherwise constructed upon.

3.13 RESTORATION

A. Restore all lawn and surface areas, whether within the Contract limits or not, disturbed as a result of earthwork operations of this job.

B. Conduct earthwork operations in a manner that prevents spillage on streets and adjacent areas. Clean-up spillage, on-site and off-site, caused by earthwork operations.

3.14 PROTECTION OF EXCAVATIONS

A. Protect newly graded areas from traffic and erosion. Repair settlement and washing that occurs prior to acceptance of Work. Reestablish grades to required elevations and slopes.

3.15 DISPOSAL OF EXCAVATED MATERIALS

A. Dispose of all excess excavation on the Site to location designated on plans or as directed by the Design Professional.

END OF SECTION

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SECTION 31 11 00
CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Clearing and grubbing as shown on the Drawings and described herein.

B. Clearing and grubbing shall consist of cutting and disposing of trees and removing and disposing of stumps, where designated on the Drawings or directed by the Architect/Engineer.

C. Trees under six inches (6") in diameter, shrubs, brush, windfalls, logs and other vegetation within the right-of-way, where designated on the Drawings or directed by the Architect/Engineer, shall be removed, such work being incidental to other items of the Work.

D. Trees over 4 inches in diameter shall only be removed if marked in the field by the Architect/Engineer.

1.02 QUALITY ASSURANCE

A. Permits and Regulations

1. All demolition and site clearance is subject to all provisions of applicable local ordinances and regulations.
2. All local codes, rules and regulations governing the respective utilities shall be observed in executing all Work under this Section.

1.03 JOB CONDITIONS

A. Protection

1. Protect from damage existing items indicated to remain by the erection of barriers or by other means approved by the Architect/Engineer.
2. All open depressions, excavations, pits, and the like, shall be barricaded. Adequate barricades shall be provided at all times. Barricades shall be constructed of materials which must conform to local safety regulations and must be acceptable to the Architect/Engineer. Remove barricades and fences when no longer required.
3. Keep all public highways and roads clean of spillage at all times. All potholes, ruts, or pavement damage shall be repaired by the Contractor immediately
4. It is the intent that barricades placed by the Contractor for safety or protection purposes be constructed of materials of the Contractor's choice, in accordance with applicable codes and regulations.

B. Utility Protection

1. The Contractor shall protect all existing utilities from damage resulting from his operations

C. Tree Protection

1. Protect all trees to remain within the Contract Limit Lines from damage or injury by any construction operation or equipment, from abuse by workmen, or any other danger that might arise as a result of this work.
2. Where existing trees are vulnerable to damage by construction operations, the Contractor shall erect suitable barriers around trees to be protected.
3. Any damage to trees resulting from insufficient protection shall be repaired by a competent tree surgeon to the satisfaction of the Architect/Engineer without cost to the Owner.
4. Remove barriers when protection is no longer required.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 CONSTRUCTION METHODS

A. Where trees cannot be felled without danger to traffic or injury to other trees, structures or property, they shall be cut in sections from the top down.

B. All desirable and structurally sound trees, saplings or shrubs suitable for shade or street beautification purposes shall be saved unless otherwise ordered by the Architect/Engineer. Trees, saplings and shrubs designated to be left in place shall not be damaged or injured by the Contractor. The absence of specific orders to remove trees, saplings or shrubs shall be considered as orders to save such trees, saplings or shrubs. Trimming of limbs of trees or saplings or trimming of shrubs shall not be done without the permission of the Architect/Engineer.

C. Under proposed concrete sidewalk, concrete curb and gutter, all types of pavement, permanent structures and at such other places as directed by the Architect/Engineer, all tree stumps shall be completely removed by excavation. Tree stumps under other areas in the right-of-way may be removed with stump cutting machinery to a depth of at least twelve inches (12") below the original ground area in fill areas, and at least twelve inches (12") below the sub-grade in cut areas.

D. The Contractor shall provide a disposal area for all trees, stumps, limbs, brush and vegetation from the project at no additional cost to the Owner.

END OF SECTION

SECTION 31 25 00
EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnishing and installing or construction of erosion control facilities in accordance with the Drawings and Specifications.

1.02 RELATED SECTIONS

A. Section 31 00 00 - Earthwork

1.03 REFERENCES

A. Wisconsin Department of Natural Resources, Conservation Practice Standards
   1. 1056 “Silt Fence”
   2. 1052 “Non-Channel Erosion Mat”
   3. 1053 “Channel Erosion Mat”
   4. 1061 “Dewatering”
   5. 1064 “Sediment Basin”
   6. 1060 “Storm Drain Inlet Protection for Construction Sites”
   7. 1057 “Stone Tracking Pad and Tire Washing”
   8. 1067 “Temporary Grading Practices for Erosion Control”

B. Wisconsin Department of Transportation “Erosion Control Product Acceptability Lists.”

1.04 GENERAL

A. Erosion control measures shall be utilized throughout the construction to prevent erosion during construction and after construction until vegetation is established. Eroded material shall not be allowed to be deposited off the Project Site.

B. Install perimeter silt fence prior to the commencement of any grading work.

C. Eroded material, refuse, rubbish or other debris shall not be deposited in any waterway.

1.05 SUBMITTALS

A. Provide submittal of silt fence information from manufacturer, showing the requirements listed below are met.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials shall adhere to Wisconsin DOT Product Acceptability List (PAL), latest edition.

PART 3 - EXECUTION

3.01 GENERAL

A. Provide erosion control measures as indicated on the Drawings. Additional erosion control measures may be necessary in addition to those indicated. Verify any additional requirements with the local agencies. If other measures are needed, provide installation in accordance with Wisconsin Department of Natural Resources Conservation Practice Standards.

B. Erosion Control products shall be listed on the Product Acceptability List by the Wisconsin Department of Transportation, unless otherwise noted on drawings.

3.02 CONSTRUCTION METHODS

A. Install erosion control measures in accordance with drawing details.

3.03 INSPECTION AND MAINTENANCE

A. Inspect erosion control measures after each rainfall and at least once per day during prolonged rainfall. Repair or replace as necessary.

B. Refer to additional erosion control notes on plans.

3.04 REMOVAL

A. Remove all erosion control facilities when permanent seeding has been established. Seed areas disturbed by erosion control facilities.

3.05 NOTICE OF TERMINATION

A. Contractor is responsible for obtaining the Notice of Termination from the Wisconsin Department of Natural Resources for the project site after site establishment. Contractor shall coordinate with the Owner and Design Professional as necessary.

END OF SECTION

SECTION 32 11 23
AGGREGATE BASE COURSE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Work under this section includes all labor, materials, equipment, and services necessary to complete the aggregate base course work as shown on the drawings and herein specified.
2. Work includes aggregate base course work for under sidewalks.

B. Related Sections

1. Division 32 Section 32 12 16 Bituminous Paving
2. Division 32 Section 32 13 13 Concrete Paving

1.02 REFERENCES

A. Wisconsin Department of Transportation, *State of Wisconsin Standard Specifications for Highway and Structure Construction*, Latest Edition.

1. Section 301 “Base, Subbase, and Subgrade Aggregate”
2. Section 305 “Dense-Graded Base”
3. Section 312 “Select Crushed Material”

1.03 SUBMITTALS

A. All submittals are to be in accordance with Section 01 33 00 Submittal Procedures.

B. Submit material certificate of compliance from material supplier or test results from testing agency for sieve analysis.

C. Submit inspection reports from Licensed Geotechnical Engineer.

D. Submit test results from testing agency for maximum density and in-place density.

E. Copy of testing agency DOT certifications for sampling.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements

1. Conform to requirements of local, state, and federal rules and regulations applicable to work and project location.
2. Conform to the applicable requirements and recommendations of the following codes, specifications, and standards except as modified by the Contract Documents and herein:
   a. Wisconsin Department of Transportation, *Standard Specifications for Highway and Structure Construction*, Latest Edition. Referred to as WisDOT Standard Specifications.
3. Where provisions of pertinent regulations, codes, and standards conflict with this specification, the more stringent provisions govern.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Crushed Aggregate

1. Materials are to meet the requirements of Section 301 “Base, Subbase, and Subgrade Aggregate” of the WisDOT Standard Specifications for Dense 1-1/4” (31.5 mm) base and Section 305 “Dense-Graded Base” for 1-1/4” (31.5 mm) or 3” (75 mm) gradation for all base layers.
2. Geotechnical Engineer to approve aggregate gradation for base layers.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Check subgrade for conformity with grade and cross section.

3.02 PREPARATION

A. Prepare the foundation/subgrade or previously placed base layer as specified in Section 211 of the WisDOT Standard Specifications, before placing aggregate base course.

B. Proof roll existing subgrade immediately prior to placement of aggregate base course.

1. Remove soft, loose, weak, and unstable or unsuitable soils and replace with approved compacted fill materials and re-compact.

3.03 CONSTRUCTION

A. Placement

1. See Section 301.3.4 of the WisDOT Standard Specifications.

B. Compaction

1. See Sections 301.3.4.2, 301.3.4.3 and 305.3.2 of the WisDOT Standard Specifications.
2. Compact the aggregate base course to 95 percent (+/- 2%) of maximum density in accordance with of the WisDOT Standard Specifications.

C. Site Tolerances

1. See Section 301.3.4 of the WisDOT Standard Specifications.
2. Smoothness: Not more than ¼” above design grade or ½” below design grade.

3.04 FIELD QUALITY CONTROL

A. Site Tests, Inspection

1. Inspections
   a. Inspections to be performed by a licensed Geotechnical Engineer, or technician under his/her direction.
   b. Geotechnical Engineer to approve subgrade prior to aggregate base course placement.
   c. Geotechnical Engineer to approve the aggregate base course installation.
   d. Inspection to occur during subgrade compaction and after compaction of base course.
2. Testing
   a. Engage a testing agency with a licensed Geotechnical Engineer on staff acceptable to the Design Professional to perform sampling and testing responsibilities as specified.
   b. If tests indicate Work does not meet specified requirements, remove Work and replace. Retesting to be done, as required, until installation meets the specifications, and no further consideration for additional compensation will be

given.

c. See Section 301.2.3 of the WisDOT Standard Specifications for sampling and testing standards.

3. All costs of inspections, tests and transportation of test material are considered incidental to the project, and no further consideration for additional compensation will be given.

END OF SECTION

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SECTION 32 12 16
BITUMINOUS CONCRETE PAVING

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes

1. Work under this section includes all labor, materials, equipment, and services necessary to complete the bituminous concrete paving work as shown on the drawings and herein specified.

B. Related Sections

1. Section 32 11 23 Aggregate Base Course

1.02 REFERENCES

A. Wisconsin Department of Transportation, *State of Wisconsin Standard Specifications for Highway and Structure Construction*, Latest Edition.

1. Section 450 “General Requirements for Asphaltic Pavements”
2. Section 455 “Asphaltic Materials”
3. Section 460 “Hot Mix Asphalt Pavement”
4. Section 465 “Asphaltic Surfaces”
5. Section 475 “Seal Coat”

B. Wisconsin Asphalt Pavement Association, “2021 Asphalt Pavement Design Guide.”

C. Wisconsin Asphalt Pavement Association, “2021 Asphalt Parking Lot Design Guide.”

1.03 DEFINITIONS

A. Asphaltic Binder: The principal asphaltic binding agent in HMA, including asphalt cement and material added to modify the original asphalt cement properties.

B. Design Life: The design life is the period of time during which the pavement is expected by the designers to provide a certain level of service. It is original construction to a time where the pavement needs reconstruction, typically 15 to 20 years.

C. ESAL: Equivalent single axle load. ESAL is a measurable relationship of pavement damage over the design life compared to the effects of axles carrying different loads.

D. Filler: A finely divided mineral aggregate added to asphaltic mixtures to improve mixture properties.

E. HMA: Hot Mix Asphalt

F. HT: Heavy traffic level classification, > 8 million ESAL

G. Leveling Layer: Initial layer placed thinner than the minimum required under Wisconsin Department of Transportation, Standard Specifications Section 460.3.2.

H. Lower Layer: Any asphaltic pavement layer that will not be exposed to traffic when the pavement structure is complete. A pavement structure may have multiple lower layers.

I. LT: Light traffic level classification, < 2 million ESAL

J. MT: Medium traffic level classification, 2 – 8 million ESAL

K. PG: Performance Graded

L. Upper Layer: The asphaltic pavement layer exposed to traffic when the pavement structure is complete. A pavement structure has only one upper layer.

1.04 SUBMITTALS

A. All submittals are to be in accordance with Section 01 33 00 Submittal Procedures.

B. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties

1. Submit product information for asphalt and aggregate materials.
2. Submit mix design with laboratory test results supporting design.

C. Material Certificates: For each paving material, from manufacturer.

1.05 QUALITY ASSURANCE

A. Regulatory Requirements

1. Conform to requirements of local, state, and federal rules and regulations applicable to work and project location.
2. Conform to the applicable requirements and recommendations of the following codes, specifications, and standards except as modified by the Contract Documents and herein:
    a. Wisconsin Department of Transportation, *State of Wisconsin Standard Specifications for Highway and Structure Construction*. Referred to as WisDOT Standard Specifications.
3. Where provisions of pertinent regulations, codes, and standards conflict with this specification, the more stringent provisions govern.

B. Certifications

1. Performance Graded Asphalt Binders:
    a. Sampling and testing are in accordance with the most current version of the Combined State Binder Group Certification Method of Acceptance for Asphalt Binders.
2. Other asphaltic materials:
    a. Sampling other asphaltic material is in accordance with the Section 455.2.2.2 of the WisDOT Standard Specifications.
    b. Testing is in accordance with the Section 455.2.3.2 of the WisDOT Standard Specifications.
3. Hot Mix Asphalt Pavement:
    a. Provide coarse aggregates from a Wisconsin Department of Transportation approved source.

1.06 PROJECT CONDITIONS

A. Project Environmental Requirements

1. Transporting and Delivering Mixtures
    a. Deliver the mixture to the paver receiving hopper at a temperature between 260-300° F. Asphalt delivered below 260° F may be rejected by Design Professional. Cover all loads during inclement weather or when the ambient air temperature falls below 65° F.
2. Environmental Limitations:
    a. Tack Coat: Apply tack coat only when the air temperature is 32° F or more and the surface is dry and reasonably free of loose dirt, dust, or other foreign matter. Do not apply if weather or surface conditions are unfavorable or before impending rains.

b. HMA Pavement – Lower Layer: Do not place asphaltic mixture when the air temperature approximately 3 feet above grade, in shade, and away from artificial heat sources is less than 36° F. The lower layer and base course may be placed at a lower temperature with the Design Professional's written approval.

c. Place asphaltic mixture only on a prepared, firm and compacted base, foundation layer, or existing pavement substantially surface-dry and free of loose and foreign material. Do not place over frozen subgrade or base, or when the roadbed underlying the foundation or base is temporarily unstable from the effects of frost heaving. Unless the contract provides otherwise, incorporate loose roadbed aggregate as a part of preparing the foundation, in shoulder construction, or dispose of as the Design Professional approves.

d. Do not place asphaltic mixture between October 15 and May 1, regardless of temperature, without the Design Professional's written approval or direction. Do not construe the Design Professional's non-approval as grounds for extending contract time. The Design Professional will conduct the final inspection and determine acceptance when the placement is complete.

e. If the Design Professional directs or allows placing asphaltic mixtures between October 15 and May 1, either by request or to complete the work to the stage the contract requires, the work will be performed at one's own risk. The Design Professional may subsequently revoke acceptance based on the results of a post-acceptance inspection in May. Restore all pavement damage or defects the Engineer attributes to temperature or other weather conditions occurring between October 15 and May 1 by repairing or replacing pavement the Design Professional directs.

3. Pavement Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40° F for oil-based materials, and not exceeding 95° F.

PART 2 - PRODUCTS

2.01 ACCESSORIES

A. Exterior pavement markings

1. Cold Paint: Type S or Type N traffic paint in accordance with AASHTO Designation M248. Regular set drying time, applied per manufacturer's instructions.
2. Use only lead-free paint.

2.02 AGGREGATES

A. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.

B. Fine Aggregate: ASTM D 1073, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

C. Mineral Filler: ASTM D 242, rock or slag dust, hydraulic cement, or other inert material.

2.03 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO M 320, Performance Graded Binder as specified:

1. LT Traffic Classification
   a. LT 58-28 S
      i. Northern and Southern Asphalt Zone
      ii. 20-yr Design ESALs < 2 Million
      iii. No modifications, for normal traffic situations
      iv. Residential driveways
      v. School and recreational areas

vi. Parking lots
vii. Low volume roads

2. MT Traffic Classification
   a. MT 58-28 S
      i. Northern and Southern Asphalt Zone
      ii. 20-yr Design ESALs 2 – 8 Million
      iii. No modifications, for normal traffic situations
      iv. Industrial parking lots
      v. Medium volume rural roadways
   b. MT 58-28 H
      i. Northern and Southern Asphalt Zone
      ii. 20-yr Design ESALs 2 – 8 Million
      iii. Applications similar to MT 58-28 S
      iv. Slow moving traffic situations

B. Tack Coat: ASTM D 977 emulsified asphalt or ASTM D 2397 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

C. Recycled Asphaltic Materials: Recycled asphaltic materials content is according to Section 460.2.5 of the WisDOT Standard Specifications, except the maximum allowable percentage for the Upper Layer is 22%.

2.04 MIXES

A. Asphalt Paving Mixtures: Areas designated as Light Duty are designed as HMA Pavement LT in accordance with Section 460 of the WisDOT Standard Specifications. Areas designated as Heavy Duty are designed as HMA Pavement MT.

B. Asphaltic mixture, which, in the judgment of the Design Professional, is not sufficiently mixed or is defective in another manner, will be rejected.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Site Verification of Conditions
   1. Verify that elevations and gradients of base are correct.

B. Proof roll existing subgrade immediately prior to placement of aggregate base course.
   1. Proof roll with at least two passes performed in a crisscross pattern with a fully loaded tri-axle dump truck with a minimum gross weight of 30 tons, or equivalent acceptable to the Design Professional.
   2. Remove soft, loose, weak, and unstable or unsuitable soils and replace with approved compacted fill materials and re-compact.

3.02 PREPARATION

A. Protection
   1. All exposed surfaces not to be covered with asphaltic concrete are to be protected during priming so that asphalt cement will not adhere to or discolor the surface. No pockets are to remain in the finished surface to prevent lateral drainage of water. All low spots are to be replaced at no additional cost to the Owner.
   2. Contact surfaces of curbs, gutters, underground appurtenances, and other structures are to be painted with a thin, uniform coating of hot asphalt cement, or asphalt cement dissolved in naphtha before the surface mixture is placed against them. The surface material is to be placed uniformly high so that after compaction, it will be approximately

¼" higher than adjacent gutter flanges and all other structures.

B. Surface Preparation

1. Apply tack coat to contact surfaces of curbs and concrete paving.
2. Coat surfaces of manhole frames with oil to prevent bond with asphalt paving. Do not tack coat these surfaces.
3. Cut edge of existing bituminous surfaces against which new pavement abuts in a straight and perpendicular cut.

3.03 INSTALLATION

A. Water valve boxes and manhole frames are to be set to ¼" below the finished pavement grade.

B. Loose material to be removed during the construction of all middle and upper lifts.

C. Sweep or clean dust, dirt, debris and other foreign matter from the road prior to application of the tack coat.

D. Machine place hot-mix asphalt on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and thickness when compacted. Place asphalt pavement in accordance with Section 460 of the WisDOT Standard Specifications.

E. Promptly correct surface irregularities in paving course behind paver. Use suitable hand tools to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.04 APPLICATION

A. Tack coat is to be applied at a rate of 0.050 to 0.070 gallons per square yard after dilution in conformance with Section 455.3.2 of the WisDOT Standard Specifications.

1. Apply to surfaces on the longitudinal joints between successive paver passes and on contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement.
    a. Tack coat may be eliminated if previous course is freshly placed and thoroughly clean.
    b. Allow tack coat to dry until at proper condition to receive paving.

3.05 CONSTRUCTION

A. Site Tolerances

1. Density: Minimum required density is to conform to WisDOT Standard Specifications, Table 460-3 for traffic lanes.
2. Thickness: In-place compacted thickness tested in accordance with ASTM D 3549 will not be acceptable if exceeding the following tolerances:
    a. Lower Layer: Plus or minus 1/4 inch (6 mm).
    b. Upper Layer: Plus 1/4 inch (6 mm), no minus.
3. Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied parallel to and at right angles to centerline of paved areas:
    a. Lower (Base) Course: Plus or minus ½ inch.
    b. Upper (Surface) Course: Plus ¼ inch, no minus.
    c. Crowned Surface: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is ¼ inch.

B. Joints

1. Construct joints to ensure a continuous bond between adjoining paving sections.

Construct joints free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

a. Clean contact surfaces and apply tack coat to joints.

b. Offset longitudinal joints, in successive courses, a minimum of 6 inches (150 mm).

c. Offset transverse joints, in successive courses, a minimum of 24 inches (600 mm).

d. Construct transverse joints at each point where paver ends a day's work and resumes work at a subsequent time. Construct these joints using either "bulkhead" or "papered" method according to AI MS-22, for both "Ending a Lane" and "Resumption of Paving Operations."

C. Compaction

1. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.

2. Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted in accordance with Section 460 of the WisDOT Standard Specifications.

3. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

4. Compact all layers of HMA mixture to 91.0 – 93.0% of target maximum density. Refer to WisDOT Standard Specifications, Table 460-3, particularly Note 3 related to lower layers constructed on crushed aggregate or recycled base courses.

5. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

6. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

7. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

D. Pavement Marking:

1. Allow paving to age for 30 days prior to starting pavement marking.

2. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer’s recommended rates to provide a minimum wet film thickness of 15 mils.

3.06 REPAIR/RESTORATION

A. Existing surfaces to be seal coated

1. Adhere to Section 475 “Seal Coat” of the WisDOT Standard Specifications.

2. Immediately prior to application of asphalt material, existing surfaces are to be thoroughly cleaned with a power broom or other suitable equipment to remove dirt and other objectionable matter.

3. The asphalt material is to be applied in a single application at a rate of approximately 1/3-gallon per square yard. When the desired stage of tackiness of the asphalt coat is attained, aggregate for seal coat cover is to be spread uniformly over the treated surface by mechanical spreaders. The amount of aggregate is to be sufficient to completely cover the treated surface but limited to the approximate amount that can be embedded in and bonded by the asphalt material.

4. Roll surface immediately after spreading the aggregate to ensure aggregate is thoroughly embedded in the asphalt material and the surface is smooth and uniform in texture.

3.07 FIELD QUALITY CONTROL

A. Furnish a nuclear density machine with a qualified operator to verify field compaction. Testing to be performed the day of placement with a minimum of five density tests for every 200-ton placed. The five tests are taken across the width of the mat at a location determined by the Design Professional. The average of those five tests must meet minimum required density conforming to WisDOT Standard Specifications, Table 460-3.

B. Paving density disincentives in conformance with Section 460.5.2.2 of the WisDOT Standard Specifications will be administered.

C. All costs of testing and transportation of test material are considered incidental to the project, and no further consideration for additional compensation will be given.

END OF SECTION

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SECTION 32 13 13
CONCRETE PAVING

PART 1 - GENERAL

1.01 DESCRIPTION

1. Work under this section includes all labor, materials, equipment, and services necessary to complete the reinforced cement concrete paving work as shown on the drawings and herein specified.

B. Related work: Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions and Sections in Division 1 of these Specifications.

C. Related Sections

1. Section 03 10 00 Concrete Forms and Accessories
2. Section 03 20 00 Concrete Reinforcement
3. Section 32 11 23 Aggregate Base Course

1.02 REFERENCES

A. Conform to the applicable requirements and recommendations of the following codes, specifications, and standards except as modified by the Contract Documents and herein:

1. American Concrete Institute, ACI 301-99 "Specifications for Structural Concrete."
2. American Concrete Institute, ACI 304R-00 "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete."
3. American Concrete Institute, ACI 304.2R - 96 "Placing Concrete by Pumping Methods."
4. American Concrete Institute, ACI 330R-08 "Guide for the Design and Construction of Concrete Parking Lots."
5. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
6. Wisconsin Department of Transportation, Standard Specifications, latest edition
   a. Section 415 “Concrete Pavement”
7. ASTM International, ASTM A 615/ 615M – 01b “Standard Specification for Deformed and Pain Billet-Steel Bars for Concrete Reinforcement.”
8. ASTM International, ASTM C 114 – 03 “Standard Test Methods for Chemical Analysis of Hydraulic Cement.”

1.03 SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00 Submittal Procedures.

B. Concrete Mixture Design: Submit concrete mixture design for each mixture for Design Professional’s review. Obtain Design Professional’s approval of mix before mixing concrete.

1. For aggregates: Provide types, pit or quarry locations, producers’ names, gradings, specific gravities, and field test data used to establish the required average strength
2. For Admixtures: Provide types, brand names, producers, manufacturer’s technical data sheets, and certification data
3. Include alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1.04 QUALITY ASSURANCE

A. Use adequate numbers of skilled workers who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Do not commence placement of concrete until mix designs have been reviewed and approved

by the Architect/Engineer and all governmental agencies having jurisdiction and until copies of the approved mix designs are at the job site and the batch plant.

C. Provide access for, and cooperate with, the inspector and testing laboratory representative.

1.05 PRODUCT DELIVERY: STORAGE AND HANDLING

A. Cement: Store in weather-tight enclosures and protect against dampness, contamination, and warehouse set.

B. Aggregates:
   1. Stock pile to prevent excessive segregation, or contamination with other materials or other sizes of aggregates.
   2. Use only one supply source for each aggregate stock pile.

C. Admixtures:
   1. Store to prevent contamination, evaporation or damage.
   2. Protect liquid admixtures from freezing or harmful temperature ranges.
   3. Agitate emulsions prior to use.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Allowable Concrete Temperatures:
   1. Cold weather: Maximum and minimum, ASTM C 94.
   2. Hot weather: Maximum 90`F.
   3. Do not place concrete during rain, sleet or snow unless protection is provided.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Forms and Accessories:
   1. See Section 03 10 00.

B. Reinforcement:
   1. See Section 03 20 00.

C. Concrete:
   1. See Section 03 30 00.

D. Isolation Joint Filler
   1. Provide closed-cell polyethylene foam expansion joint filler, complying with ASTM D 3575.
   2. Comply with ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork in preformed strips.

E. Dowel Bars and Tie Bars
   1. Shall conform to Wisconsin Department of Transportation, Standard Specifications Section 505

F. Curing Materials
   1. Spray membrane curing compound

G. Other Materials
   1. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect/Engineer.

2.02 EQUIPMENT

A. Meets the requirements of the Wisconsin Department of Transportation, Standard Specifications (latest version) Section 415.3.1.

2.03 CONCRETE

A. Concrete shall conform to the applicable requirements of Section 03 30 00 except as otherwise specified. Concrete shall have a minimum compressive strength of 3500 PSI at 28 days. Maximum size of aggregate shall be 1-½ inches.

B. Air Content

1. Mixtures shall have air content by volume of concrete of 5 to 7 percent, based on measurements made immediately after discharge from the mixer.

C. Slump

1. The concrete slump shall be 2 inches where determined in accordance with ASTM C 143/ C 143M.

D. Comply with the following as minimums:

1. Portland cement: ASTM C 150, Type I or II, low alkali.

E. Aggregate, general:

1. ASTM C 330, uniformly graded and clean
2. Do not use aggregate known to cause excessive shrinkage.
3. Aggregate, coarse: crushed rock or washed gravel with maximum size between ¾" and 1 ½", and with minimum size number 4.
4. Aggregate, fine: natural washed sand of hard and durable particles varying from fine to particles passing a 3/8" screen, of which at least 12% shall pass a 50-mesh screen.

F. Water: Clean and potable

G. Use only such additives as are recommended in the mix design and approved by the Architect/Engineer and governmental agencies having jurisdiction.

H. Provide concrete in the proportions established by the approved mix design.

2.04 OTHER MATERIALS

A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect/Engineer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Surface Conditions

1. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

3.02 PREPARATION

A. Protection

1. Protect any adjacent surfaces from any spilling from the concrete work.

B. Final preparation of subgrades

1. After preparation of subgrade as specified in another Section of these Specifications, thoroughly scarify and sprinkle the entire area to be paved and then compact to a smooth, hard, even surface of 95% compaction to receive the concrete.
2. Contractor shall grade subgrade to provide positive drainage away from new building.

C. Placement of Subbase Course

1. Subbase:
    a. Spread the specified coarse aggregate to a thickness providing the compacted thickness shown on the Drawings.
    b. Compact to 95% modified proctor.
2. Thickness tolerance: Provide the compacted thickness shown on the Drawings within a tolerance of minus 0.0” to plus 0.5”.
3. Smoothness tolerance: Provide the lines and grades shown on the Drawings within a tolerance of 0.05 feet vertically and 1” in alignment at any point.
4. Correct deviations by removing materials, replacing with new materials and reworking or recompacting as required.
5. Use only the amount of moisture needed to achieve the specified compaction.

3.03 INSTALLATION

A. Upon completion of base course and formwork, install reinforcement (if required) as shown on the Drawings.

1. Clean reinforcement to remove loose rust and mill scale, earth and other materials which reduce bond or destroy bond with concrete.
2. Position, support and secure reinforcement against displacement by formwork, construction and concrete placement operations.
3. Place reinforcement to obtain the required coverage for concrete protection.

B. Transit mix the concrete in accordance with provisions of ASTM C 94.

1. With each load, provide ticket certifying to the materials and quantities and to compliance with the approved mix design.
2. On the transit-mix ticket, state the time water was first added to the mix.
3. At the batch plant, withhold 2-½ gal of water per cu yd of concrete.
4. Upon arrival at the job site, and as directed by the testing laboratory inspector, add all or part of the withheld water before the concrete is discharged from the mixer.
5. Mix not less than five minutes after the withheld water has been added and not less than one minute of that time immediately prior to discharge of the batch.
6. Unless otherwise directed provide 15 minutes total mixing time per batch after first addition of water.

C. Do not use concrete that has stood over 30 minutes after leaving the mixer or concrete that is not placed within 60 minutes after water is introduced into the mix.

D. Conveying:

1. Place concrete in accordance with the following and pertinent recommendations contained in ACI 304.
2. Deposit concrete continuously in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section.
3. If a section cannot be placed continuously, provide construction joints as specified herein.
4. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic.
5. Deposit concrete as nearly as practicable in its final location so as to avoid segregation due to rehandling and flowing.
6. Do not subject concrete to any procedure which will cause segregation.
7. Do not use concrete which becomes non-plastic and unworkable or does not meet required quality control limits or has been contaminated by foreign materials.

8. Remove rejected concrete from the Site.

E. Deposit and consolidate concrete in a continuous operation within the limits of construction joints until the placing of a panel or section is completed.
   1. Bring surfaces to the correct level with a straightedge and then strike off.
   2. Use bull floats or darbies to smooth the surface, leaving it free from bumps and hollows.
   3. Do not sprinkle water on the plastic surface. Do not disturb the surfaces prior to start of finishing operations.

F. Expansion joints:
   1. Do not permit reinforcement to extend continuously through any expansion joint.
   2. Locate expansion joints along the edges of all structures and where indicated, filled to full depth with expansion joint material.

G. Finishing:
   1. Begin floating when the water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation.
   2. During or after the first floating, check the planeness or surface with a ten-foot straightedge applied at not less than two different angles.
   3. Cut down high spots and fill low spots and produce a surface level within ¼" in two feet as determined by a two-foot straightedge placed anywhere on the surface in any direction.
   4. Refloat the surface immediately to a uniform sandy texture.
   5. While the surface is still plastic provide a textured finish by drawing a fiber bristle broom uniformly over the surface.
      a. Unless otherwise directed by the Architect/Engineer provide the texturing in one direction only.
      b. Provide light, medium or course texturing as directed by the Architect/Engineer.

3.04 CURING AND PROTECTION

A. Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury.

END OF SECTION

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SECTION 32 91 19
TOPSOIL AND FINISH GRADING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnishing and placing topsoil.

B. Finish grading.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Section 32 92 00: Lawns and Grasses

1.03 PROJECT CONDITIONS

A. Consult the Owner's site construction plans for known underground and surface utility lines.

B. Protect existing trees, plants, lawns and other features designated to remain as part of the landscaping work.

C. Promptly repair damage to adjacent facilities caused by earthwork operations. Cost of repair at Contractor's expense.

D. Promptly notify the Architect/Engineer of unexpected subsurface conditions.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All soil material is subject to testing and inspection.

B. Topsoil: Natural, friable, fertile soil characteristic of productive soil in the vicinity, reasonably free of stones, clay lumps, roots and other foreign matter. Soil removed from agricultural land shall not have had crops grown on it for at least two years.

1. Proposed topsoil material shall be acceptable to the Architect/Engineer.

PART 3 - EXECUTION

3.01 FINISH GRADING

A. Finish grading within Contract limits, including adjacent transition areas, to new elevations, levels, profiles and contours indicated.

B. Grade surfaces to assure areas drain away from structures and to prevent ponding and pockets of surface drainage.

C. Lawn: 6" minimum depth of topsoil at landscape areas.

D. Perform grading, within branch spread of existing trees to remain, by hand methods to elevations indicated.

E. Fine grade topsoil eliminating rough and low areas to ensure positive drainage.

F. Remove stones, roots, weeds and debris while spreading topsoil materials. Rake surface clean of stone 1" or larger in any dimension and all debris. Provide surfaces suitable for soil preparation provided under lawn and planting work.

G. Maintenance:

1. Protect finish graded areas from traffic and erosion. Keep free of trash and debris. Repair and reestablish grades in settled, eroded and damaged areas.

2. Where completed areas are disturbed by construction operations or adverse weather, scarify, reshape and compact to required density.

3.02 DISPOSAL OF WASTE MATERIALS

A. Remove from site and legally dispose of trash and debris.

3.03 CLEANING

A. Upon completion of earthwork operations, clean areas within contract limits, remove tools and equipment. Provide site clear, clean, free of debris and soot.

END OF SECTION

SECTION 32 92 00
LAWNS AND GRASSES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section Includes:
   1. Seeding.
   2. Sodding.
   3. Lawn renovation.
   4. Finish grading.
   5. Erosion-control material(s).
   6. PVC Chases for Irrigation System.

B. Related Sections:
   1. Section 31 00 00 "Earthwork" for excavation, filling and backfilling, and grading.
   2. Section 32 93 00 “Plants” for planting, edging and mulches.

1.03 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Manufactured Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

D. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill immediately beneath planting soil.

E. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

F. Growing Season: Defined as April 1 through November 1

1.04 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Certification of Grass Seed: From seed vendor for each grass-seed monostand or mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.
   1. Certification of each seed mixture for turfgrass sod, identifying sources, including name and telephone number of suppliers.

C. Qualification Data: For qualified landscape Installer.

D. Product Certificates: For soil amendments and fertilizers from manufacturer.

E. Certification of weed-free straw mulch, if utilized.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of lawns during a calendar year. Submit before expiration of required initial maintenance periods.

1.05 REGULATORY REQUIREMENTS

A. Comply with applicable regulations for fertilizer and herbicide composition and application. Include evidence of compliance from applicable agencies having jurisdiction over herbicide/pesticide application and copies of applicator's current license.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixtures.

C. Erosion control products shall be listed on the Wisconsin Department of Transportation's Product Acceptability List (PAL).

D. Seeding shall be performed in accordance with the Wisconsin Department of Transportation Standard Specifications Section 630 'Seeding.'

1.06 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful lawn establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on project site when preparation and planting is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

1. Forward results to Owner.
2. Contractor to pay for material testing.

C. Topsoil Analysis: Furnish soil analysis by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; action exchange capacity; deleterious material; pH; and mineral and plant-nutrient content of topsoil.

1. Report suitability of topsoil for lawn growth. State-recommended quantities of nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory topsoil.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Seed: Deliver seed in original sealed, labeled, and undamaged containers. Labels to indicate weight, analysis, and name of manufacturer.

B. Protect seed and fertilizer from deterioration and wetting during delivery and while stored at site.

C. Sod: Harvest, deliver, store, and handle sod according to requirements in TPI's "Specifications for turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in its "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying out.

1.08 PROJECT CONDITIONS

A. Work Notification: Notify Architect at least five (5) working days prior to start of seeding operations.

B. Protect existing facilities from damage caused by seeding operations.

C. Determine location of above grade and underground utilities and perform work in a manner that will avoid damage. Hand excavate as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

D. Perform seeding and sodding work after planting and other work affecting ground surface has been completed.

E. Perform seeding and sodding work within trade-accepted dates to accomplish acceptable

lawns.

F. Restrict foot traffic from lawn areas until grass is established. Erect signs and barriers as required.

G. Provide hose and lawn watering equipment as necessary.

H. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.09 MAINTENANCE SERVICE AND WARRANTY

A. Initial Lawn Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable lawn is established, but for not less than the following periods:

1. Seeded Lawns: Minimum 60 growing season days from date of planting completion (see definition for growing season)
    a. When initial maintenance period has not elapsed before end of planting season, or if lawn is not fully established, continue maintenance during next planting season.
2. Sodded Lawns: Minimum 30 growing season days from date of planting completion (see definition for growing season)

B. Warranty lawns through specified lawn maintenance period, and until final acceptance.

PART 2 - PRODUCTS

2.01 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: Provide seed of local (less than 100 miles radius) genotypes.

C. Seed Species: Seed of grass species as follows, with not less than 80 percent germination, not less than 90 percent pure seed, and not more than 0.5 percent weed seed:

1. Sun and Partial Shade: Proportioned by weight as follows:
    a. 50 percent Kentucky Bluegrass (Poa pratensis), a minimum of three improved cultivars.
    b. 30 percent Chewings Red Fescue (Festuca rubra variety).
    c. 20 percent Perennial Ryegrass (Lolium perenne).

2.02 TURFGRASS SOD

A. Turfgrass Sod: Certified, complying with TPI’s “Specifications for Turfgrass Sod Materials” in its “Guideline Specifications to Turfgrass Sodding.” Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Sun and Partial Shade: Proportioned by weight as follows:
    a. 50 percent Kentucky Bluegrass (Poa pratensis), a minimum of three improved cultivars.
    b. 30 percent Chewings Red Fescue (Festuca rubra variety).
    c. 20 percent Perennial Ryegrass (Lolium perenne).

2.03 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 2 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

a. Supplement with imported or manufactured topsoil from off-site sources when quantities are insufficient. Obtain topsoil displaced from naturally well-drained construction or mining sites where topsoil occurs at least 4 inches (100 mm) deep; do not obtain from agricultural land, bogs or marshes.

2.04 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural limestone containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Provide lime in form of dolomitic limestone.

B. Sand: Clean, washed, natural or manufactured, free of toxic materials.

2.05 ORGANIC SOIL AMENDMENTS

A. Peat: Finely divided or granular texture, with a pH range of 6 to 7.5, containing partially decomposed moss peat, native peat, or reed-sedge peat and having a water-absorbing capacity of 1100 to 2000 percent.

B. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth. Wood derivatives mixed with the manure shall be mixed with 7.5 lbs. of ammonium sulfate per cubic yard to prevent induced nitrogen deficiency.

2.06 FERTILIZER

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 percent nitrogen and 10 percent phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 1 lb per 1000 square feet of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.

2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing agency.

2.07 CRABGRASS CONTROL

A. Starter: At initial planting, apply 6-8 pounds per acre of Tupersan Wettable Powder. Water within 3 days after application

B. Maintenance: Apply 4-6 pounds per acre of Tupersan Wettable Powder four weeks after initial seeding if weed germination is a problem.

2.08 PLANTING ACCESSORIES

A. Selective Herbicides: EPA registered and approved, of type recommended by manufacturer for application.

2.09 PVC CHASES FOR LAWN SPRINKLER SYSTEM

A. PVC Pipe Sleeves

1. The irrigation pipe and wiring shall be protected at all sidewalk and roadway crossings with a sleeve measuring 3" diameter. Sleeving material at roadways shall have a minimum of eighteen inches (18") of cover and walk ways a minimum of twelve inches, (12') respectively.

2.10 MULCHES

A. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic; free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

B. Hydroseed: Use 60 to 75 lbs. of hydroseed per 100 gallons for hose application.

C. Erosion Control Blanket: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a degradable natural or synthetic fiber netting.

1. Comply with the Erosion Control Technology Council (ECTC) Standard Specification for Temporary Rolled Erosion Control Products, for type of erosion mat called out on plan.
    a. Include manufacturer's recommended steel wire or biodegradable staples, 6 inches (150 mm) long.
2. Comply with the Wisconsin Department of Transportation Erosion Control Product Acceptability Lists (PAL).

D. Straw Hay:

1. WCIA certified weed-free straw. Straw well seasoned before bailing, free from mature seed bearing stalks or roots of prohibited or noxious weeds. Should be used with a biodegradable tackifier to keep straw from blowing away.
2. Fields and storage sites shall be independently inspected by WCIA to be noxious weed free.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive lawns and grass for compliance with requirements and other conditions affecting installation and performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydro-seeding and hydro-mulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.03 LAWN PREPARATION

A. Limit lawn subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches (150 mm). Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Thoroughly blend planting soil mix and soil amendments off-site before spreading topsoil, apply soil amendments and fertilizer on surface.
    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.

b. Mix lime with dry soil before mixing fertilizer.

2. Spread planting soil mix to a depth of 4 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

a. Spread approximately 1/2 the thickness of planting soil mix over loosened subgrade. Mix thoroughly into top 2 inches (50 mm) of subgrade. Spread remainder of planting soil mix.

C. Unchanged Subgrades: If new lawns are to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.

2. Loosen surface soil to a depth of at least 6 inches (150 mm).

3. Remove stones larger than 1 inch (25 mm) in any dimension and sticks, roots, trash, and other extraneous matter.

4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch (13 mm) of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared lawn areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, restore areas if eroded or otherwise disturbed after finish grading.

G. Areas with slopes less than 25% shall be seeded by hydro-seeding. Areas with slopes equal to or greater than 25% shall be seeded and mulched with erosion mat, as defined on drawings.

3.04 SEEDING

A. Sow seed and fertilizer per Method A or B of the Wisconsin Department of Transportation (DOT) Standard Specifications, section 630.3.3 ‘Sowing.’

B. Do not broadcast or drop seed when wind velocity exceeds 5 mph (8 km/h). Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

C. Do not use wet seed or seed that is moldy or otherwise damaged.

D. Sow seed at a minimum rate of 5 to 8 lb per 1000 square feet. No-mow seed lawn mixture should be sowed at a minimum rate of 5 lb per 1000 square feet.

E. Rake seed lightly into top 1/8 inch (3 mm) of soil if seed was broadcast rather than drilled, roll lightly, and water with fine spray.

F. Protect seeded areas from hot, dry weather or drying winds by applying mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly and roll surface smooth.

3.05 MULCHING

A. If seed was spread per Method A of the Wisconsin DOT Standard Specifications, provide

1. Clean, seed-free salt hay or threshed straw of wheat, rye, oats or barley, free from mature seed-bearing stalks or roots of prohibited or noxious weeds.

a. Protect seeded areas with slopes not exceeding 1:4 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose depth over seeded areas. Spread by hand, blower, or other suitable equipment.

b. Apply biodegradable tackifier over mulch to prevent it from blowing off site.

2. Erosion-Control Blanket or Mesh: Install from top of slope, working downward, and as

recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

a. Protect seeded areas with slopes exceeding 1:4 and drainage swales with erosion-control blankets installed and stapled according to manufacturer's written instructions.

3.06 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within one hour after planting. During the first two weeks after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches (38 mm) below sod. After the sod is firmly rooted into subsoil, reduce watering to less frequent, deeper watering. Base watering on weather and soil conditions and health of sod.

3.07 LAWN RENOVATION

A. Renovate existing lawn damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish lawn where settlement or washouts occur or where minor re-grading is required.
2. Provide new topsoil as required.

B. Remove sod and vegetation from diseased or unsatisfactory lawn areas; do not bury in soil.

C. Remove topsoil containing foreign materials resulting from Contractor's operations, including oil drippings, fuel spills, stone, gravel, and other construction materials, and replace with new topsoil.

D. Where substantial lawn remains, mow, de-thatch, core aerate, and rake. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

E. Remove waste and foreign materials, including weeds, grass, vegetation, and turf, and legally dispose of them off Owner's property.

F. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches (150 mm).

G. Apply soil amendments and initial fertilizers required for establishing new lawns and mix thoroughly into top 4 inches (100 mm) of existing soil. Provide new planting soil to fill low spots and meets.

H. Apply seed and protect with hydro-mulch, straw mulch or a straw erosion mat as required for new lawns.

I. Water newly planted areas and keep moist until new lawn is established. If existing lawn is fertilized or treated with herbicide, water as needed to prevent burn-out.

3.08 LAWN MAINTENANCE

A. Maintain and establish lawn by watering, fertilizing, weeding, mowing, trimming, replanting, and other operations. Roll, re-grade, replant, fertilize, and/or re-mulch to produce a uniformly

smooth lawn. Provide materials and installation the same as those used in the original installation.

1. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.

B. Watering: Provide and maintain temporary piping, hoses, and lawn-watering equipment to convey water from sources to water lawn to prevent grass and soil from drying out. Water according to seed mix instructions.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water lawn with fine spray at a minimum rate of 1 inch (25 mm) per week unless rainfall precipitation is adequate.

C. Mow lawn as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowing. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowing to maintain the following grass height:

1. Mow grass to a height of 2-1/2 to 3 inches.
2. Contractor is responsible for providing first two mowings of the newly established lawn.

D. Post-fertilization: Apply fertilizer to lawn six to eight weeks after initial seeding and fertilizer was applied and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb. per 1,000 square feet (0.5 kg per 100 square meters) of lawn area.

3.09 SATISFACTORY LAWNS

A. Lawn installations shall meet the following criteria as determined by Architect:

1. Satisfactory Seeded Lawn: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. (0.92 sq. m) and bare spots not exceeding 5 by 5 inches (125 by 125 mm).
2. Satisfactory Sodded Lawn: At end of maintenance period, a healthy, well-rooted, even-colored, viable lawn has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish lawns that do not comply with requirements and continue maintenance until lawns are satisfactory.

3.10 FINAL ACCEPTANCE

A. Payment for seeding will be based on an acceptable stand of grass grown on the site as determined by the Architect, and as indicated under satisfactory lawn. If an acceptable stand of grass is not produced within 60 calendar days of initial seeding, the Owner reserves the right to perform the seeding and cost of this work will be deducted from the Contract. The 60 days applies to the growing period, nominally April 1 to November 1, but dependent upon actual weather conditions as decided by Owner.

B. Seeding shall be completed and approved before final acceptance of the project can be made by the Architect/Engineer. This includes two mowings as described under the Maintenance item.

3.11 CLEANUP AND PROTECTION

A. Promptly remove soil and debris, created by lawn work, from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted

areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after lawn is established.

END OF SECTION

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SECTION 32 93 00
PLANTS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Soil preparation.
   2. Trees, shrubs and groundcovers.
   3. Topsoil and soil amendments.
   4. Mulch and planting accessories.
   5. Tree stabilization.
   6. Landscape edgings.
   7. Initial maintenance of landscape materials.

B. Related Sections:
   1. Section 31 00 00 "Earthwork" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
   2. Section 32 92 00 "Lawns and Grasses" for lawn and planting.

1.02 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they are grown, with ball size not less than diameter and depth recommended by ANSI Z60.1 for type and size of tree or shrub required; wrapped, tied, rigidly supported, and drum laced as recommended by ANSI Z60.1.

C. Clump: Where three or more young trees were planted in a group and have grown together as a single tree having three or more main stems or trunks.

D. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

E. Finish Grade: Elevation of finished surface of planting soil.

F. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

G. Multi-Stem: Where three or more main stems arise from the ground from a single root crown or at a point right above the root crown.

H. Planting Soil: Native or imported topsoil, manufactured topsoil, or surface soil modified to become topsoil; mixed with soil amendments.

I. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

J. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

1.03 SUBMITTALS

A. Submit topsoil source, and soils analysis, and recommendations for soil amendments and fertilizers.
   1. Furnish a soil analysis made by a qualified independent soil-testing agency stating percentages of organic matter, inorganic matter (silt, clay and sand), deleterious material, pH, and mineral and plant-nutrient content of soil.

2. Report suitability of topsoil for growth of applicable planting material. State recommended quantities of nitrogen, phosphorus, and potash nutrients and any limestone, aluminum sulfate, or other soil amendments to be added to produce satisfactory topsoil.

B. Submit maintenance instructions that include recommended procedures to be established by Owner for maintenance of plantings during a calendar year. Submit before expiration of required maintenance periods.

1. Procedures shall include removal of trunk-wrap and future fertilization recommendations.

2. Furnish one copy of written maintenance instructions to Architect.

C. Submit warranty information for plantings.

D. Submit plant material record drawings.

1. Identify field changes of dimension and detail and changes made by Change Order.

2. Provide any additional installation notes that impact the installation process.

1.04 QUALITY ASSURANCE

A. Contractor Qualifications: A qualified landscape Contractor whose work has completed landscaping work similar in material, design, and extent to that indicated for this project and with a record of successful landscape establishment.

1. Contractor's Field Supervision: Require Contractor to maintain an experienced full-time supervisor on Project site when planting is in progress.

B. Provide quality, size, genus, species, and variety of exterior plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock." Provide healthy, vigorous stock grown in accordance with good horticultural practice and free of disease, insects, eggs, larvae, and defects such as knots, sun-scald, injuries, abrasions, or disfigurement.

1. Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, and providing that the larger plants will not be cut back to size indicated.

2. Stock listed in quantity on plant list shall be matched in size and characteristics.

3. Label at least one tree, one shrub and one groundcover of each variety with a securely attached waterproof tag bearing legible designation of botanical and common name.

C. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of 2 years.

D. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 6 inches (150 mm) above the ground for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the ground for larger sizes. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip.

E. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability with proposed alternative materials to Architect at least 2 weeks prior to installation.

1. Adjustments will be made at no additional cost to the Owner, except if downsized, credits will be based on comparable industry costs.

2. Container plants may be substituted for those designated as “BB” only if approved by Architect.

F. Observation and Inspection: Architect may observe plantings either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality. Architect retains right to observe trees and shrubs further for size and condition of balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory or

defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

G. Ship landscape materials with certificates of inspection required by governing authorities. Comply with regulations applicable to landscape materials.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Take necessary precautions in good trade practice in preparing plants for moving. Spray deciduous plants in foliage with an approved 'Anti-Desiccant" immediately after digging to prevent plant from wilting. Dig, pack, transport, and handle plants with care to ensure protection against injury. Cover plants transported on open vehicles

B. Inspection certificates required by law shall accompany each shipment invoice or order to stock and on arrival, the certificate shall be filed with the Architect.

C. Do not prune trees and shrubs before delivery except as approved by Architect. Protect bark, branches, and root systems from sun scald, drying, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape.

D. Handle planting stock by root ball or container to prevent damage to stock. Do not drop stock during delivery and handling.

E. Deliver stock after preparations for planting have been completed and plant immediately. Do not let plants dry out. If planting is delayed more than six hours after delivery, set plants in shade, protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock with soil, wet peat moss, or in a manner acceptable to Architect. Soak roots that are in dry condition in water for two hours. Water heeled-in plants daily.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

F. Do not deliver more plant materials than can be planted in one day. Label stock as noted in quality assurance.

1.06 PROJECT CONDITIONS

A. Work Notification: Notify Architect at least 7 working days prior to installation of plant material.

B. Protect Existing Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties concerns.

C. A complete list of plants, including a schedule of sizes, quantities and other requirements is shown on the drawings. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting plans shall govern.

D. Planting Restrictions:

1. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions (i.e. compacted or heavy soils), or obstructions, notify Architect before planting.
2. Planting Time: Proceed with, and complete landscape work as rapidly as portions of the site become available, working within seasonal limitations for each kind of landscape work required. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed and according to manufacturer's written instructions and warranty requirements.

F. Coordination with Lawns: Plant trees and shrubs after finish grades are established and before planting lawns unless otherwise acceptable to Architect.

1. If planting of trees and shrubs occurs after lawn work, protect lawn areas and promptly repair damage to lawns resulting from planting operations.

1.07 WARRANTY

A. Special Warranty: Contractor's standard form in which Contractor agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from lack of adequate maintenance, neglect, abuse by Owner, or incidents that are beyond Contractor's control (fires, floods, freezing rains, lightning storms, or winds over 75 miles per hour, winter kill caused by extreme cold and severe winter conditions not typical of plantings areas).

b. Structural failures including plantings falling or blowing over.

c. Faulty operation of tree stabilization.

d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

B. Warranty Periods from Date of Substantial Completion:

1. Trees and Shrubs: One year.

2. Perennials and Grasses: One year.

C. Include the following remedial actions as a minimum:

1. Remove dead plant material immediately. Replace immediately unless required to plant in the succeeding planting season.

2. Replace plant material that is more than 25 percent dead or in an unhealthy condition at end of warranty period.

3. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.

4. Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.

5. Repair damage to other plants or lawn during plant replacements at no cost to the Owner.

1.08 MAINTENANCE SERVICE

A. Initial Maintenance Service for Trees and Shrubs: Provide full maintenance by skilled employees of landscape Contractor. Maintain as required in Part 3.10. Begin maintenance immediately after each area is planted and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below.

1. Maintenance Period: Three months from date of substantial planting completion.

B. Initial Maintenance Service for Ground Cover and Plants: Provide full maintenance by skilled employees of landscape Contractor. Maintain as required in Part 3.10. Begin maintenance immediately after each area is planted and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below.

1. Maintenance Period: Three months from date of substantial planting completion.

PART 2 - PRODUCTS

2.01 TREE AND SHRUB MATERIAL

A. General: Furnish nursery-grown trees and shrubs complying with ANSI Z60.1, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched,

healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Provide trees and shrubs of sizes, grades, and ball or container sizes as indicated complying with ANSI Z60.1 for types and form of trees and shrubs required. Trees and shrubs of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls. Cracked or mushroomed balls are not acceptable.

C. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the plant list.

D. No pruning wounds shall be present with a diameter of more than 1” and such wounds must show vigorous bark on all edges.

E. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

F. If formal arrangements or consecutive order of trees or shrubs is shown, select stock for uniform height and spread, and number label to assure symmetry in planting.

2.02 SHADE AND FLOWERING TREES

A. Shade Trees: Single-stem trees with straight trunk, well-balanced crown, and intact leader, of height and caliper indicated, complying with ANSI Z60.1 for type of trees required.

1. Provide balled and burlapped trees.
2. Branching Height: One-third to one-half of tree height.

B. Small Upright Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:

1. Stem Form: Single trunk, unless noted on drawings as multistem.
2. Provide balled and burlapped trees.

C. Small Spreading Trees: Branched or pruned naturally according to species and type, with relationship of caliper, height, and branching according to ANSI Z60.1; stem form as follows:

1. Stem Form: Single trunk, unless noted on drawings as multistem.
2. Provide balled and burlapped trees.

2.03 DECIDUOUS SHRUBS

A. Form and Size: Shrubs with not less than the minimum number of canes required by and measured according to ANSI Z60.1 for type, shape, and height of shrub.

1. Shrub size measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.
2. Single stemmed or thin plants will not be accepted.
3. Side branches shall be generous, well twigged, and the plant as a whole well-bushed to the ground.
4. Provide balled and burlapped or container shrubs. Potted plants shall not be loose in container or pot bound.

2.04 CONIFEROUS EVERGREENS

A. Form and Size: Normal-quality, well-balanced, coniferous evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.

1. Provide balled and burlapped trees.
2. Provide balled and burlapped or container shrubs. Refer to drawing for specifications. Potted plants shall not be loose in container or pot bound.
3. Coniferous trees shall be branched to the ground.

2.05 BROADLEAF EVERGREENS

A. Form and Size: Normal-quality, well-balanced, broadleaf evergreens, of type, height, spread, and shape required, complying with ANSI Z60.1.

1. Shearing Designation: Natural, never sheared (N) or Semi-sheared or lightly sheared (LS).
2. Provide balled and burlapped or container shrubs.

2.06 PERENNIALS

A. Perennials: Provide healthy, field-grown plants from a commercial nursery, of species and variety shown or listed, complying with requirements in ANSI Z60.1.

1. Provide potted plants in sizes indicated on drawings.
2. Potted plants shall not be loose in container or pot bound as specified on drawings.

2.07 TOPSOIL

A. Topsoil: ASTM D 5268, pH range of 5.5 to 7, a minimum of 2 percent organic material content; free of stones 1 inch (25 mm) or larger in any dimension and other extraneous materials harmful to plant growth.

1. Topsoil Source: Reuse surface soil stockpiled on-site. Verify suitability of stockpiled surface soil to produce topsoil thru soils analysis. Clean surface soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth. Identify other sources of topsoil location proposed for use on the project.

2.08 ORGANIC SOIL AMENDMENTS

A. Peat: Sphagnum peat moss, partially decomposed, finely divided or granular texture, with a pH range suitable for intended purpose. Weed and seed free raw or baled peat, containing not more than 9% mineral on a dry basis.

B. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste of uniform texture; free of chips, stones, sticks, soil, or toxic materials. Add 7.5 lbs. ammonium sulfate (34-0-0 or 21-0-0) per cubic yard of sawdust.

C. Manure: Well-rotted, un-leached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth. Wood derivatives mixed with the manure shall be mixed with 7.5 lbs. of ammonium sulfate per cubic yard to prevent induced nitrogen deficiency.

D. Lime: Natural dolomitic limestone containing not less than 85 percent of total carbonates with a minimum of 30 percent magnesium carbonates, ground so that not less than 90 percent passes a 10-mesh sieve and not less than 50 percent passes a 100-mesh sieve.

2.09 FERTILIZER

A. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 4 percent nitrogen and 20 percent phosphoric acid.

B. Poultry guano granular form, free from dust and feathers.

C. Commercial Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing following percentages of available plant nutrients.

1. For trees and shrubs use specified 2 ounce or greater microporous slow release fertilizer packets with not less than 16 percent total nitrogen, 8 percent available phosphoric acid and 16 percent soluble potash.

2.10 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood, Ground or shredded bark, or wood and bark chips. If wood-

based organic mulch is used, a commercial fertilizer with higher nitrogen content (12-6-4) should be applied with mulch to off-set potential for nitrogen deficiency.

B. Mineral Mulch: to be used where noted on plans, particularly as a 30" wide mow strip along building areas outside of foundation plantings. Free from deleterious materials and suitable as a top dressing of trees and shrubs in combination with weed barrier fabric, consisting of one of the following:

1. Type: 1.1/2 inch river washed stone without fines

2.11 WEED-CONTROL BARRIERS

A. Composite Fabric: Rot resistant, woven, needle-punched polypropylene substrate bonded to a non-woven polypropylene fabric, minimum 4.0 oz. per square yard. Water and air permeable. Color gray or black.

2.12 EDGING

A. Planting beds should be contained with one of the following edging, as noted on plans:

1. Rigid PVC: Oly Ola Edgings 'Black Edg-Knight' or approved equivalent, 5" high engineered rigid PVC landscape edging for straight-line and curvilinear applications in corrugated straight profile. Section shall have openings on side of section to receive stakes spaced approximately 2 to 3 feet (610 mm to 915 mm) apart along its length.
   a. Thickness: .09 inch to 0.105 inch with 1 inch round top
   b. Material: Pure polyethylene with 3.5%-4% carbon black concentrate, medium density with melt factor under 2
   c. Length: 20 feet (6.2 meters), selected products in 8 feet (2.44 meters) sections.
   d. Connection Method: Section ends shall slide together to interlock adjacent sections with connection being locked by a single stake.
   e. Stake: 9.25 inch Steel Stake
   f. Finish: Black

B. Individual trees and shrubs shall incorporate spade-cut edging, unless otherwise noted on drawings.

1. Spade-cut Edging: Edging to be created either manually or mechanically with a landscape edger to create a 3-4" deep trench.

2.13 TREE STABILIZATION MATERIALS

A. Tree stabilization shall be incorporated if site is typically exposed to high winds or if soil has not completely settled after development. Landscape Contractor's judgment shall be used to determine whether stabilization shall be needed.

1. Staking: Tree stakes shall be hardwood stakes, not less than two inches by two inches (2"x2"), or steel fence posts. Stakes shall be wired to the trees using rubber hose of sufficient length to keep the wires from coming into contact with the bark.
   a. Guy wire shall be 12 gauge minimum with white surveyor's flagging tape or approved equal attached to wire midway between each stake and tree.
2. Tree Staple: Use the below-ground tree stabilization method to secure root ball to soil, rather than the traditional staking and guying. Refer to manufacturer's specifications for installation instructions.
   a. Manufacturer: Tree Staple, 139 South Street, New Providence, NJ 07974, USA, telephone: (877) 873-3749, fax (908) 464-8878, email: sales@treestaple.com, website: www.treestaple.com
   b. Or approved equivalent

2.14 MISCELLANEOUS PRODUCTS

A. Trunk-Wrap Tape: Crinkled paper, 4-inch- (100-mm-) wide minimum, with stretch factor of 33 percent. Secure with biodegradable twine. Before applying to trunk, inspect to ensure that

there is no mechanical or insect damage to trunk. Wrapping a trunk that has either of these problems can worsen these conditions. Remove within one year, typically in early to mid spring. Use at landscape Contractor's discretion.

B. Precast Planters: Place at least a 4-inch (100 mm) layer of gravel in bottom of planters, cover with non-woven fabric, and fill with planter soil mixture. Place soil in lightly compacted layers to an elevation of 1-1/2" inches (38 mm) below top of planter, allowing natural settlement.

1. Planter Soil Mixture: 1 part topsoil, 1 part coarse sand and 1 part compost.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Before planting, clean topsoil of roots, plants, sods, stones, clay lumps, and other extraneous materials harmful or toxic to plant growth and 1" in diameter or larger.

D. Mix specified soil amendments and fertilizers with topsoil at rates recommended based on soil test results.

E. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of modified layout before planting.

F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.03 PLANTING BED ESTABLISHMENT AND INSTALLATION

A. Loosen subgrade of planting beds to a minimum depth of 4 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Spread topsoil and soil amendments on surface and thoroughly blend planting soil mix.

B. Finish Grading: Grade planting beds to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.

C. Before planting, restore planting beds if eroded or otherwise disturbed after finish grading.

3.04 EXCAVATION FOR TREES AND SHRUBS

A. Pits and Trenches: Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation.

1. Excavate approximately three times as wide as ball diameter for balled and burlapped stock.
2. Excavate at least 12 inches (300 mm) wider than root spread and 6" deeper than container.
3. If drain tile is shown or required under planted areas, excavate to top of porous backfill over tile.

B. Obstructions: If obstructions are encountered that are not shown on the drawings, do not

proceed with planting operations until alternate plant locations have been selected.

C. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

3.05 TREE AND SHRUB PLANTING

A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.

B. Set balled and burlapped stock plumb and in center of pit or trench with top of root ball flush with adjacent finish grades. Place plants to give the best appearance or relationship to adjacent elements.

1. Pull away burlap and ropes from the tops of the root balls and partially from the sides, but do not remove from under root balls. Completely remove wire baskets to prevent future root girdling. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
2. Install the slow release fertilizer packets at the bottom of the pits of the trees and shrubs per the manufacturer's directions and in the quantity recommended for the plant size.
3. If tree stabilization is needed, install tree stake per manufacturer's instructions.
4. Place planting soil mix around root ball in layers, tamping to settle mix and eliminate voids and air pockets. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of planting soil mix.
5. Create a temporary topsoil berm 3" above finish grade at a diameter 2' greater than the root ball. This shall be used as a watering basin. Contractor shall remove at the end of the maintenance period.

3.06 GROUND COVER AND PERENNIAL PLANTING

A. Set out and space ground cover and plants as shown on drawings.

B. Dig holes large enough to allow spreading of roots and backfill with planting soil. Do not bend roots.

C. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water. Firm planting mixture around roots but avoid compacting.

D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

3.07 MULCHING

A. For individually-placed trees and shrubs, apply 3-inch (75 mm) average thickness of specified mulch extending 12 inches (300 mm) beyond edge of planting pit or plant canopy or spread of evergreen tree. Pull mulch away from trunk to prevent rotting.

B. Mulch planting beds according to edging lines as indicated on drawings. Apply 3-inch (75 mm) average thickness of specified mulch and edging. Pull mulch away from plant bases to prevent rotting.

1. Planting beds to be mulched with stone mulch shall be installed over weed-barrier fabric.
2. All planting beds with organic mulch shall receive pre-emergence herbicide treatment in accordance with manufacturer's instructions for surface application just after the installation of the mulch.

3.08 TREE STABILIZATION

A. Refer to section 2.13.

3.09 TREE AND SHRUB PRUNING

A. Only prune to remove dead or broken branches off of plant.

3.10 PLANT MAINTENANCE

A. Tree and Shrub Maintenance: Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, restoring planting saucers, adjusting and repairing stakes and guy supports, and resetting to proper grades or vertical position, as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease. Restore or replace damaged tree wrappings.

B. Ground Cover and Plant Maintenance: Maintain and establish plantings by watering, weeding, fertilizing, mulching, and other operations as required to establish healthy, viable plantings.

3.11 ACCEPTANCE

A. Inspection to determine acceptance of planting areas will be made by the Architect, upon contractor's request. Provide notification at least ten (10) working days prior to requested inspection date.

1. Planted areas will be accepted provided all requirements, including maintenance, have been complied with and plant materials are alive and in a healthy vigorous condition.
2. Upon acceptance, the Owner will assume plant maintenance.

3.12 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.13 DISPOSAL

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 32 93 10
FILTRATION DEVICE

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Soil preparation

B. Related Sections:
   1. Section 31 00 00 "Earthwork" for excavation, filling, and rough grading and for subsurface aggregate drainage and drainage backfill materials.
   2. Section 32 92 00 "Lawns and Grasses" for lawn and planting.

1.02 DEFINITIONS

A. Finish Grade: Elevation of finished surface of planting soil.

B. Engineered Soil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

C. Subsoil: All soil beneath the topsoil layer of the soil profile and typified by the lack of organic matter and soil organisms.

1.03 REFERENCES

A. Wisconsin DNR Conservation Practice Standard 1004: Bioretention for Infiltration.

1.04 SUBMITTALS

A. Submit work experience of at least two other filtration devices (i.e. rain gardens or bioretention devices) work experience job references.

B. Submit engineered soil source, and breakdown of elements.
   1. Sand properties
   2. pH
   3. Compost
      a. Include OMRI listing

C. Submit warranty information for plantings.

D. Submit plant material record drawings.
   1. Identify field changes of dimension and detail and changes made by Change Order.
   2. Provide any additional installation notes that impact the installation process.

E. Submit installation pictures highlighting the following steps:
   1. Native soil showing area is not compacted or filled with sediment
   2. Native soil and sand interface layer
   3. Installation of cleanout port and discharge connection
   4. Gravel storage layer showing aggregate is washed and compacted
   5. Engineered soil as separate components
   6. Engineered soil during mixing process
   7. Engineered soil installation
   8. Mulch installation prior to planting
   9. Finished device with healthy plant materials shown.

1.05 QUALITY ASSURANCE

A. Contractor Qualifications: A qualified Contractor whose work has completed at least two successful filtration device or approved equivalent work similar in material, design, and extent to that indicated for this project and with a record of successful landscape establishment.

1. Contractor shall submit proof of successful installations.
2. Contractor's Field Supervision: Subcontractor must maintain an experienced full-time supervisor on Project site during construction and installation.

B. Do not make substitutions. If specified landscape material is not obtainable, submit proof of non-availability with proposed alternative materials to Architect at least 2 weeks prior to installation.

1. Adjustments will be made at no additional cost to the Owner, except if downsized, credits will be based on comparable industry costs.

C. Observation and Inspection: Architect may observe plantings either at place of growth or at site before planting for compliance with requirements for genus, species, variety, size, and quality.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver stock after preparations for planting have been completed and plant immediately. Do not let plants dry out. If planting is delayed more than six hours after delivery, set plants in shade, protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock with soil, wet peat moss, or in a manner acceptable to Architect. Soak roots that are in dry condition in water for two hours. Water heeled-in plants daily.
2. Do not remove container-grown stock from containers before time of planting.
3. Water root systems of plants stored on-site with a fine-mist spray. Water as often as necessary to maintain root systems in a moist condition.

B. Do not deliver more plant materials than can be planted in one day.

1.07 PROJECT CONDITIONS

A. Work Notification: Notify Design Professional at least 7 working days prior to installation of plant material.

B. Protect Existing Utilities: Determine location of underground utilities and perform work in a manner which will avoid possible damage. Hand excavate as required. Maintain grade stakes set by others until removal is mutually agreed upon by parties' concerns.

C. A complete list of plants, including a schedule of sizes, quantities and other requirements is shown on the drawings. In the event that quantity discrepancies or material omissions occur in the plant materials list, the planting plans shall govern.

D. Installation Restrictions: The contractor shall immediately notify the Design Professional if compaction or other conditions detrimental to the long-term success of the filtration device are discovered. The contractor shall not install device until the conditions are rectified.

E. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed and according to manufacturer's written instructions and warranty requirements.

F. Coordination with Lawns: Plant install filtration device and plantings following stabilization of vegetated swale to enter filtration device to prevent clogging of device.

1.08 WARRANTY

A. Special Warranty: Contractor's standard form in which Contractor agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from lack of neglect, abuse by Owner, or incidents that are beyond Contractor's control (fires, floods, freezing rains, lightning storms, or winds over 75 miles per hour, winter kill caused by extreme cold and severe winter conditions not typical of plantings areas).

B. Warranty Periods from Date of Substantial Completion:
   1. All plants: One year.
   2. Filtration device: One year.
      a. If filtration device fails within one year of substantial completion, then the contractor shall completely replace the gravel storage bed, engineered soil, mulch and plantings. The contractor shall then warranty the replacement filtration device for a further period of six months following substantial completion of replacement filtration device.
      b. See Section 3.09 on “Indicators of Filtration Device Failure.”

C. Include the following remedial actions as a minimum:
   1. Remove dead plant material immediately. Replace immediately unless required to plant in the succeeding planting season.
   2. Replace plant material that is more than 50 percent dead or in an unhealthy condition at end of warranty period.
   3. A limit of one replacement of each plant will be required except for losses or replacements due to failure to comply with requirements.
   4. Provide extended warranty for replaced plant materials; warranty period equal to original warranty period.
   5. Repair damage to other plants or lawn during plant replacements at no cost to the Owner.

1.09 MAINTENANCE SERVICE

A. Initial Maintenance Service: Begin maintenance immediately after area is planted and continue until plantings are acceptably healthy and well established by final acceptance, but for not less than three months of the growing season from date of substantial planting completion. (i.e. if planted in October, maintenance service shall continue until at least June)

PART 2 - PRODUCTS

2.01 PERENNIALS

A. Perennials: Provide healthy, field-grown plants from a native plant commercial nursery, of species and variety shown or listed, complying with requirements in ANSI Z60.1.
   1. Provide potted plants in sizes indicated on drawings.
   2. Potted plants shall not be loose in container or pot bound as specified on drawings.

2.02 ENGINEERED SOIL

A. The engineered soil shall consist of 75% mineral (SiO_2) sand and 25% compost.
   1. Sand shall meet standards for fine aggregate concrete sand in the Wisconsin Standards and Specifications for Highway Construction, Section 501.2.5.3.4 2005 Edition, or approved equal.
      a. Sand shall consist of at least 97% SiO_2.
      b. Substitutions are not allowed.
      c. Sand shall be washed prior to mixing.
   2. Compost shall meet the requirements of the Wisconsin DNR specification S100, Compost.
      a. Compost shall be OMRI listed (Organic Materials Review Institute)

b. Compost may be Purple Cow Organics Activated Compost ™ with MicroLife or approved equal.

i. Purple Cow Organics, LLC – 608-831-0349

3. The engineered soils shall be uniform, and free of stones, stumps, roots or other similar objects larger than 1" in diameter.
4. The engineered soil shall have a pH between 5.5 and 6.5.
5. The engineered soil shall be placed in 6" lifts. Depth of soil shall accommodate compaction.

2.03 GRAVEL STORAGE BED MATERIALS

A. Storage layer may consist of either of two materials:
   1. Washed, coarse sand
   2. #2 aggregate

B. The top 8" of storage layer shall be washed pea gravel. Pea gravel shall be large enough to prevent falling through perforations of under-drain pipe.

C. The interface between the native soil and the storage layer shall be mixed so that 3" of sand is mixed with 2-4" of native soil.
   1. Note: Inadequate washing of aggregate may result in clogging at native soil interface.

2.04 PERFORATED PIPE WITH FILTER SOCK

A. Perforated PVC pipe with filter sock
   1. End plugs shall be installed at ends where it does not daylight.

B. The filter sock shall have openings in the fabric small enough to prevent sand particles from entering the underdrain pipe.
   1. The flow rate of fabric shall be capable of passing water at a rate equal to or greater than the flow capacity of the total combined perforations in the underdrain pipe.
   2. The fabric shall meet the Wisconsin Standards & Specifications for Highway & Structure Construction, Section 612.2.8 (1-3), 2003 or approved equal.

2.05 EROSION CONTROL

A. Coconut erosion mat, WISDOT Class II type B or C, shall cover planting bed.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Compaction and smearing of the soils beneath the floor and side slopes of the filtration area shall be minimized.

D. Compaction of the soils to be utilized for the soil planting bed shall be minimized.

3.02 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. During site development, the area dedicated to the filtration device shall not have heavy equipment traffic.

D. Remediate soils by refracturing the soil to a depth of at least 12 inches.

3.03 GRAVEL STORAGE BED

A. Mix the bottom 2 to 4 inches of native soil with sand.

B. Add approved storage layer material in multiple lifts not exceeding 6”.

3.04 ENGINEERED SOIL BED

A. Mix engineered soil components prior to placement of engineered soil in filtration device

B. The moisture content shall be suitable to prevent clumping and compaction during placement.

C. Place in multiple lifts not exceeding 12” in depth.

D. Steps may be taken to induce mild settling of engineered soil bed as needed to prepare a stable planting medium and to stabilize the ponding depth.

1. Vibrating plate-style compactors shall not be used to induce settling.

E. The engineered soils shall be placed 2” higher than finish elevation to accommodate settling.

3.05 EROSION CONTROL

A. Planting bed shall be covered with coconut erosion mat.

3.06 PERENNIAL PLANTING

A. Set out and space ground cover and plants as shown on drawings.

B. Pull mulch aside and install plant in soil. Pull mulch from base of plant but ensure proper soil contact.

C. Work soil around roots to eliminate air pocket. Firm planting mixture around roots but avoid compacting.

D. Water thoroughly after planting, taking care not to cover plant crowns with wet soil or mulch.

3.07 DEVICE MAINTENANCE

A. Native Planting Maintenance: Maintain and establish plantings by watering, weeding, mulching, and other operations as required to establish healthy, viable plantings.

B. Filtration Device Maintenance

1. Inspections and Maintenance
    a. Inspect on a regular basis to ensure that it is functioning properly and is not clogged
    b. Inspect for potential failure of device caused by sedimentation.
    c. Inspections shall be performed by the installer within 12 hours after every rain event that produces a minimum of 0.5% rain over the course of 24 hours following substantial completion for three months.
    d. After the three months following substantial completion of the filtration device, the inspections shall be performed by the Owner.
    e. Determine whether there is any erosion, and repair as needed
    f. Determine whether the overflow device is open and clear of debris, repair as needed
    g. Access the perforated drain tile to clean out any debris
    h. Contractor shall fill in areas of engineered settlement and coat with erosion mat.
2. Contractor shall open the emergency draw-down plug to allow for plantings to establish for a minimum of two months. After plant establishment, contractor shall plug emergency draw-down device and inspect for at least one month after device has been plugged.

3.08 FINAL ACCEPTANCE

A. Inspection to determine acceptance of planting areas will be made by the Design Professional, upon contractor's request. Provide notification at least ten (10) working days prior to requested inspection date.

1. Planted areas will be accepted provided all requirements, including maintenance, have been complied with and plant materials are alive and in a healthy vigorous condition.
2. Before final acceptance, the Contractor shall have held a maintenance and care meeting with the Owner to understand how to care for device.
3. Upon acceptance, the Owner will assume plant maintenance.

3.09 INDICATORS OF FILTRATION DEVICE FAILURE

A. Failure is evident by the following factors:

1. Dying plants
2. Visible and non-visible soil deposits over the mulch layer
3. Standing water for more than 24 hours.

3.10 CLEANUP AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

3.11 DISPOSAL

A. Disposal: Remove surplus soil and waste material, including excess subsoil, unsuitable soil trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION

SECTION 33 00 00
UTILITY SERVICES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included: This Section describes necessary labor, materials, tools and equipment for the excavation, installation, construction, and backfilling of the following, including pipes, pipe trenches, and associated appurtenances, as shown on the Drawings and specified herein:

1. All necessary State and local permits.
2. Conduits for electrical service. Coordination and control of installation of electrical service by local Utility Company.
3. Coordination with other trades.

1.02 RELATED WORK DESCRIBED ELSEWHERE

A. Section 31 00 00: Earthwork

B. Section 26 00 00: Electrical Scope of Work

1.03 QUALITY ASSURANCE

A. Qualification of Installers: Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

B. Codes and Standards: Comply with all State of Wisconsin Construction Codes and with county and other local requirements.

1.04 SUBMITTALS

Product Data: Within 15 calendar days after award of the Contract, submit:

A. Complete materials list of all items proposed to be furnished and installed under this Section.

B. Manufacturers' specifications and other data required to demonstrate compliance with the specified requirements.

C. Manufacturers' recommended installation procedures which, when approved by the Architect/Engineer, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the Work.

1.05 PRODUCT HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all other trades.

B. Protection of Utilities: Protect existing utilities as specified in Section 02 30 00.

C. Delivery and Storage: Deliver all materials to the job site in their original containers with all labels intact and legible at time of use. Store in strict accordance with the manufacturers' recommendations as approved by the Architect/Engineer.

D. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.

PART 2 - PRODUCTS

2.01 Not Used

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to the timely and proper completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 BACKFILLING

A. General:

1. Backfill in accordance with the provisions of Section 31 00 00, and as specified herein. Take all necessary care to assure thorough compaction of fill under haunches of the pipe, without damage or misalignment of the pipe.
2. Where approved by the Architect/Engineer, sheeting and portions of bracing used may be left in place. Do not leave untreated sheeting in place beneath structures or pavements.

B. Movement of Construction Machinery: Use all means necessary to avoid displacement of, and injury to, the pipe and structures while compacting by rolling or operating equipment parallel with the pipe. Movement of equipment over piping at any stage of construction is solely at the risk of the Contractor.

3.03 SURFACE CONDITIONS

A. General:

1. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
2. Verify that site utilities may be installed in strict accordance with all pertinent codes and regulations and the approved shop drawings.

B. Discrepancies:

1. In the event of discrepancy, immediately notify the Architect/Engineer.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.04 EXISTING SERVICES

A. Where existing sewers, domestic, and heating piping, gas, potable water, electric, or other services are encountered in areas in which their presence was unknown by best available information (including information from local utility companies), each affected Contractor shall take adequate steps to protect such services.

B. If such existing services require relocation, make written request for ruling from the Architect/Engineer. Do not proceed on such portions of the Work until written instructions are received.

C. Inactive services shall be plugged, capped, or removed. Notify utility companies, municipal agencies having jurisdiction and Architect/Engineer. Protect or remove as directed.

3.05 CLOSING IN UN-INSPECTED WORK

A. General: Do not cover up or enclose work until it has been properly and completely tested, inspected, and approved.

B. Non-Compliance: Should any of the work be covered up or enclosed prior to all required inspections and approvals, uncover the work as required and, after it has been completely inspected and approved, make all repairs and replacements with such materials as are necessary to the approval of the Architect/Engineer and at no additional cost to the Owner.

END OF SECTION

CGC, Inc.
Construction • Geotechnical
Consulting Engineering/Testing

APPENDIX ITEM 01

September 21, 2022
C22435

Mr. Joe Stadelman
Angus-Young Architects/Engineers
555 South River Street
Janesville, WI 53548

Re: Geotechnical Exploration Report
Proposed Salt Storage Building
Rock County Highway Department
Orfordville, Wisconsin

Dear Mr. Stadelman:

Construction • Geotechnical Consultants, Inc. (CGC) has completed the geotechnical exploration program for the project referenced above. The purpose of this exploration program was to evaluate the subsurface conditions within the proposed construction area and to provide geotechnical recommendations regarding site preparation, foundation, floor slab, below-grade wall and pavement design/construction. A determination of the site class for seismic design and a discussion of the on-site stormwater infiltration potential are also included. We are sending you an electronic copy of this report and can provide a paper copy upon request.

PROJECT DESCRIPTION

We understand that an approximately 7,000-square foot salt storage building with an asphalt floor is planned at the existing Rock County Highway Department Shop on West Beloit Street in Orfordville, Wisconsin. The new building is planned east to northeast of the current shop building and will be constructed partially into a grass-covered hillside. The finished floor of the single-story structure is planned at EL 923.8 ft, which is near to up to about 8 ft below existing site grades in western and southeastern portions of the planned building footprint, respectively. Greater cutting on the order of 15 ft will be required to establish pavement elevations southeast of the building area. The wood structure will bear on perimeter footings and foundation walls bearing 4 to 5 ft below finished floor or finished exterior site grades. Portions of the north, east and south walls will be constructed partially below grade where the building is constructed into the existing hill side. Although not provided, we assume building loads will be light to moderate, typical of wood-framed construction. In addition to the planned building and exterior pavement improvements, a stormwater management area is planned southwest of the new salt storage building.

The planned construction area is largely a grass-covered slope. Based on a provided site plan (Angus Young, 1-ft contours), existing site grades within the construction area slope up away from the existing building to the south and east between about EL 923 and 940 ft.

2921 Perry Street, Madison WI 53713
Telephone: 608/288-4100
FAX: 608/288-7887

SUBSURFACE CONDITIONS

Subsurface conditions for this study were explored by drilling three Standard Penetration Test (SPT) soil borings (labeled SB-1 through SB-3) within the proposed building and pavement areas to planned depths of 25 ft below current site grades. The borings were conducted by On-Site Environmental (OSE, under subcontract to CGC) on September 19, 2022 using a track-mounted Geoprobe 7822DT rotary drill rig equipped with hollow stem augers and an automatic SPT hammer. The specific procedures used for drilling and sampling are described in Appendix A.

In addition to the soil borings, one test pit (labeled TP-1) was performed within the planned stormwater management area. The test pit was excavated by Rock County staff and logged in the field by CGC on August 30, 2022. The test pit was terminated at 10.5 ft below the ground surface.

The soil boring and test pit locations were selected by the project team and field-staked by CGC. Ground surface elevations at the test locations were estimated by CGC using the topographic information on the site plan provided and should therefore be considered approximate. Boring and test pit locations are shown in plan on the Soil Boring & Test Pit Location Exhibit presented in Appendix B.

The subsurface profiles at the boring and test pit locations varied to some degree, but the following strata were typically encountered (in descending order):

- About 3 to 12 in. of ***topsoil***; over
- About 2 to 4 ft of fine-grained ***sandy lean clay, lean clay or clayey sand*** at Borings 2 and 3, as well as Test Pit 1; underlain by
- Loose to dense ***granular (sand)*** soils containing varying silt and gravel contents, as well as scattered cobbles/boulders, to the maximum depths explored.

Portions of the granular soils contained interbedded silt seams/lenses which were generally fairly thin, but an approximately 18-in. layer of *silt* was present within the sand strata at Test Pit 1.

Although groundwater was not encountered in the borings or test pits during or shortly after drilling or excavating, portions of the sand strata at Borings SB-1 and SB-3 were very moist to wet, indicating the possible presence of a perched water layer. Groundwater levels are expected to fluctuate with seasonal variations in precipitation, infiltration, evapotranspiration as well as other factors.

A more detailed description of the site soil and groundwater conditions is presented on the Soil Boring and Test Pit Logs attached in Appendix B, and on the WDSPS *Soil and Site Evaluation – Storm* form for the test pit contained in Appendix E.

DISCUSSION AND RECOMMENDATIONS

Subject to the limitations discussed below and based on the subsurface exploration, it is our opinion that the site is suitable for the proposed construction and that the structure can be supported by conventional spread footing foundations. Our recommendations for site preparation, foundation, floor slab, below-grade wall and pavement design/construction, along with discussions pertaining to the site class for seismic design and the on-site stormwater infiltration potential, are presented in the following subsections. Additional information regarding the conclusions and recommendations presented in this report is discussed in Appendix C.

1. Site Preparation

We recommend that topsoil be stripped at least 10 ft beyond the proposed construction area, including areas requiring fill beyond the building footprint and pavement limits. The topsoil can be stockpiled on-site and later re-used as fill in landscaped areas. As noted previously, topsoil was about 3 to 12 in. thick in the borings and test pit, but variable topsoil thicknesses should be expected between and beyond boring/test pit locations due to previous grading activities.

After topsoil stripping and cutting to grade, exposed subgrades are largely expected to consist of natural granular soils, with clay soils present in southern and western portions of the site where existing lower site grades are near or just above planned finished site grades. Exposed sand soils in areas remaining at grade or where minor filling may be required should be thoroughly recompacted with a vibratory roller to densify soils loosened during stripping and cutting to grade. We recommend that cohesive and fine-grained subgrades (i.e., clay and silt) be statically recompacted (i.e., without vibration) and subsequently proof-rolled with a piece of heavy rubber-tire construction equipment, such as a loaded tri-axle dump truck, to check for soft/yielding areas. Where sands remain loose after recompaction, or where soft/yielding areas are observed, these soils should be undercut and replaced with granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557) in accordance with our Recommended Compacted Fill Specifications presented in Appendix D. On-site sand soils are considered suitable for re-use provided they are separated from clay soils during excavating. Alternatively, 3-in. dense graded base (DGB) that is placed in loose 10-in. lifts and compacted until deflection ceases can also be used to restore grades in undercut areas.

2. Foundation Design

In our opinion, the building can be supported on reinforced concrete spread footing foundations bearing on medium dense to dense natural granular soils with the understanding that isolated, shallow undercutting of loose natural sands may be required in the vicinity of Boring 1. We recommend that the following parameters should be used for foundation design:

- Maximum net allowable bearing pressure: 3,000 psf

- Minimum foundation widths:
  - -- Continuous wall footings: 18 in.
  - -- Column pad footings: 30 in.

- Minimum footing depths:
  - -- Exterior/perimeter footings: 4 ft
  - -- Interior footings: no minimum requirement

Recognizing that subsurface conditions may vary across the building footprint, footing subgrades should be checked by a CGC field representative to document that the subgrade soils are suitable for footing support or otherwise advise on corrective measures, such as undercutting. We recommend using a smooth-edged backhoe bucket for footing and undercut excavations. Granular soils exposed at footing grade or at the bottom of undercut excavations should be thoroughly recompacted with a large vibratory plate compactor prior to backfilling and formwork/concrete placement to densify soils loosened during the excavation process. Soils potentially susceptible to disturbance from vibratory compaction (e.g., cohesive/fine-grained soils) should be hand-trimmed.

Undercutting will be required where loose natural sand soils that cannot be recompacted satisfactorily are encountered at or below the bottom of footings proportioned for an allowable bearing pressure of 3,000 psf. In addition, although not encountered in the borings, unsuitable existing fill, organic soils and/or softer native clay soils will also require undercutting. *Where required, the base of undercut excavations should be widened beyond the footing edges at least 0.5 ft in each direction for each foot of undercut depth for stress distribution purposes.* In order to re-establish footing grade in undercut areas, we recommend using granular backfill compacted to at least 95% compaction based on modified Proctor methods (ASTM D1557), in accordance with the Recommended Compacted Fill Specifications presented in Appendix C. The on-site sand soils are considered suitable provided they are selectively stockpiled from any clay soils. Alternatively, 3-in. DGB that is placed in loose 10-in. lifts and compacted until deflection ceases can also be used to restore grades in undercut areas. OSHA slope guidelines should be followed if workers need to enter footing excavations.

Provided the foundation design/construction recommendations discussed above are followed, we estimate that total and differential settlements should be on the order of 1.0 and 0.5 in., respectively.

3. Seismic Design Category

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

4. Below-Grade Walls

We anticipate that exterior walls constructed at least partially below grade into the hillside will be laterally restrained by the foundation/slab and building framing. Therefore, *at-rest lateral earth pressures* should be used for their design. To minimize the development of such pressures, granular backfill should be placed within 4 to 6 ft of the walls. We recommend that the granular backfill should consist of well-graded sand or sand/gravel having less than 12 percent passing the No. 200 U.S. standard sieve. Note that because portions of the on-site sand soils contain greater than 12 percent passing the No. 200 U.S. standard sieve, a three-dimensional drainage board is recommended to be used against below-grade perimeter walls to help reduce the build-up of hydrostatic pressure due to infiltrating surface water. To help further reduce the build-up of hydrostatic pressures behind the walls, a perimeter drainage system could be installed to intercept potential surface water infiltration. The granular backfill placed behind the walls should be continuously connected to this system which should be sloped to daylight downslope or to drain to a sump pit. To impede the inflow of surface moisture, the final 2 ft of backfill placed along the below-grade walls should consist of a clayey fill cap or other semi-impermeable material, which should be graded in a manner which promotes positive drainage away from the walls.

Compaction of the backfill within 4 to 6 ft of the walls should be performed with lightweight equipment to avoid the development of excessive lateral earth pressures. The backfill should be compacted to at least 93% compaction (modified Proctor) following Appendix C guidelines. Walls constructed in accordance with the above recommendations may be designed for an equivalent fluid pressure of 55 psf per ft of depth if sand with less than 12% P200 content is used to backfill the walls. If a 3-D drainage board is incorporated and sands with higher silt/clay content (SM) is used, including portions of the on-site sands, an equivalent fluid pressure of 65 psf per ft of depth should be used in the wall design. Additionally, the wall design should also account for surcharge effects that could be applied during or after construction.

5. Pavement Design/Floor Slab

We anticipate that the subgrade soils within pavement areas (including within the building) will largely consist of natural granular soils with significant silt content, with isolated areas of stiff natural clay possible within western portions of the building where existing site grades are lower. Subgrades should be prepared as described in the Site Preparation section of this report, with recompaction/proof-rolling completed prior to base course placement. *As the native clay and sand soils with significant silt content are considered somewhat moisture-sensitive and susceptible to disturbance from repetitive construction traffic, we recommend that the project budget include a generous contingency for pavement subgrade undercutting/stabilization. Subgrade improvement may involve about 12 in. of additional coarse aggregate (e.g., 3-in. DGB), potentially over biaxial geogrid (e.g., Tensar BX Type 1 or equivalent).* The areas requiring undercutting/stabilization and the depth of undercutting should be determined in the field by proof-rolling prior to installing the base course layer, and the need for undercutting/stabilization will likely depend on the weather conditions during construction.

We anticipate that interior and exterior asphalt pavement will be exposed to primarily heavy-duty truck traffic with up to 50 ESALs (18-kip equivalent single axle loads) per day during periods of the year. In view of this, we have assumed Traffic Class III following Wisconsin Asphalt Pavement Association (WAPA) recommendations where higher truck traffic loads are expected. We have also included a medium duty pavement section for traffic loads of up to 5 ESALs per day (traffic Class II) if new or reconstructed pavement areas will experience less frequent truck traffic. The pavement sections summarized in Table 1 were selected assuming a Soil Support Value "SSV" of about 4 for a firm and adequately recompacted silty sand subgrade and a design life of 20 years.

Material	**Thicknesses (in.)**		**WDOT Specification (1)**
	Traffic Class II (Medium Duty)	**Traffic Class III (Heavy Duty)**	
Bituminous Upper Layer (2,3)	1.75	2.0	Section 460, Table 460-1
Bituminous Lower Layer (2,3)	2.25	3.0	Section 460, Table 460-1
Dense Graded Base Course (2,4)	10.0	12.0	Sections 301 and 305
Total Thickness	**14.0**	**17.0**	

Notes:

1) Wisconsin DOT *Standard Specifications for Highway and Structure Construction*, latest edition, including supplemental specifications, and Wisconsin Asphalt Pavement Association *2020 Asphalt Pavement Design Guide*.

2) Compaction requirements:
   - Bituminous concrete: Refer to Section 460-3.
   - Base course: Refer to Section 301.3.4.2, Standard Compaction

3) Mixture Type LT bituminous; refer to Section 460, Table 460-2 of the *Standard Specifications*. Mixture type MT is recommended in heavy duty traffic areas. Note that an "H Grade" asphalt surface layer is recommended where there will be slow moving heavy truck traffic making turning movements.

4) The upper 4 in. should consist of 1¼-in. DGB; the bottom part of the layer can consist of 3-in. DGB.

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

We understand that concrete pavement will be utilized at exterior storage pads and possible elsewhere. In these areas, we recommend that the concrete pavement be at least 6 in. thick, be underlain by at least 6 in. of DGB and contain adequate reinforcement for crack control. Concrete slabs underlain by a minimum 6 in. thick dense graded base layer over a firm or stabilized subgrade can be designed utilizing a subgrade modulus of 150 pci. Note that a thicker pavement section (more than 6 in. of concrete) may be required depending on pavement loads, which should be evaluated by a structural engineer.

6. Stormwater Infiltration Potential

We understand that stormwater management facilities are planned to the southwest of the new building, and test pit TP-1 was performed to evaluate the subsurface conditions with regard to their stormwater infiltration potential. The subsurface profile in the test pit included lower-permeability *silt loam* and *sandy clay loam* strata to a depth of about 5 ft below current site grades, which were underlain by more permeable fine sandy loam granular deposits to the maximum depths explored. In addition to scattered, thin silt loam seams, an approximately 18-in. thick layer of silt loam was observed near a depth of about 8.5 ft below existing site grades. The silt loam was underlain by the more permeable fine sandy loam to the termination depth of the test pit.

Provided that the bottom of the infiltration system extends through the shallow lower-permeability strata and into the underlying granular soils (or lower-permeability soils are undercut below the bottom of infiltration feature and replaced with appropriate sandier soils), it our opinion that some stormwater infiltration will generally be possible on this site. V*ariability in the soil conditions should be expected across the site and within the infiltration areas that could result in a wide range of undercut depths to reach soil suitable for the design infiltration rate.*

Based on the presence of thin silt seams, as well as to loosen the generally dense sand strata, we recommend that the soils exposed at the base of the excavation be deep-tilled/ripped in an attempt break up the lower-permeability seams and improve the infiltration potential of the subsurface soils. If a design infiltration rate based on the granular soils is used for design, thicker seams/layers of fine-grained silt loam exposed within the otherwise more permeable strata will require undercutting/replacement.

Infiltration Potential: The following is a summary of the estimated infiltration rates for the soils encountered at the test pit, per Table 2 of the WDNR Conservation Practice Standard 1002, *Site Evaluation for Storm Water Infiltration*. The estimated infiltration rates are as follows:

- Sandy clay loam (SCL) 0.11 in./hr
- Silt loam (SiL) 0.13 in./hr
- Fine sandy loam (FSL) 0.50 in./hr

Note that the infiltration rates should be considered approximate since they are merely based on soil texture and do not account for in-place soil density and other factors, which will affect the infiltration rate. We recommend that, at the time of construction, the soils at and several feet below the bottom of stormwater management system be checked by a certified soil tester *in conjunction with the basin designer* to document that the soils are appropriate for the design infiltration rate or recommend remedial measures, if necessary. Refer to the WDSPS *Soil and Site Evaluation – Storm* form for TP-1, which is attached in Appendix E, for a more detailed description of the subsurface profile.

Groundwater: Groundwater was not encountered in the test pit during or upon the completion of excavating (or in the soil borings performed for this study to depths of 25 ft below current site grades). Seasonal groundwater fluctuations should be expected, as previously discussed.

Bedrock: Bedrock was not encountered in the test pits (or soil borings) performed for this study. The depth of bedrock should be expected to vary across the site.

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

CONSTRUCTION CONSIDERATIONS

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

- Earthwork construction during the early spring or late fall could be complicated as a result of wet weather and freezing temperatures. During cold weather,

exposed subgrades should be protected from freezing before and after footing construction. Fill should never be placed while frozen or on frozen ground.

- Excavations extending greater than 4 ft in depth below the existing ground surface should be sloped or braced in accordance with current OSHA standards.

- Based on observations made during the field exploration, we generally do not expect that groundwater will be encountered in the building excavation. However, water accumulating at the base of excavations as a result of precipitation or seepage should be controlled and quickly removed using pumps operating from shallow sump pits.

RECOMMENDED CONSTRUCTION MONITORING

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

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

*** * * * ***

It has been a pleasure to serve you on this project and we look forward to working with you as it proceeds. If you have any questions or need additional consultation, please contact us.

Sincerely,

CGC, Inc.

Alex J. Bina, PE, CST
Consulting Professional

Tim F. Gassenheimer, PE, CST
Senior Staff Engineer

Encl: Appendix A - Field Exploration
Appendix B - Soil Boring & Test Pit Location Exhibit
Logs of Test Borings (3)
Log of Test Pit (1)
Log of Test Boring-General Notes
Unified Soil Classification System
Appendix C - Document Qualifications
Appendix D - Recommended Compacted Fill Specifications
Appendix E - WDSPS *Soil and Site Evaluation – Storm* Form

APPENDIX A

FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

Subsurface conditions on this site were explored by drilling three Standard Penetration Test (SPT) soil borings to planned depths of 25 ft, which were sampled at 2.5-ft intervals to a depth of 10 ft and at 5-ft intervals thereafter. The soil samples were obtained in general accordance with specifications for standard penetration testing, ASTM D1586, and the specific procedures used for drilling and sampling are described below.

1. Boring Procedures between Samples
   The boring is extended downward, between samples, by a hollow-stem auger.

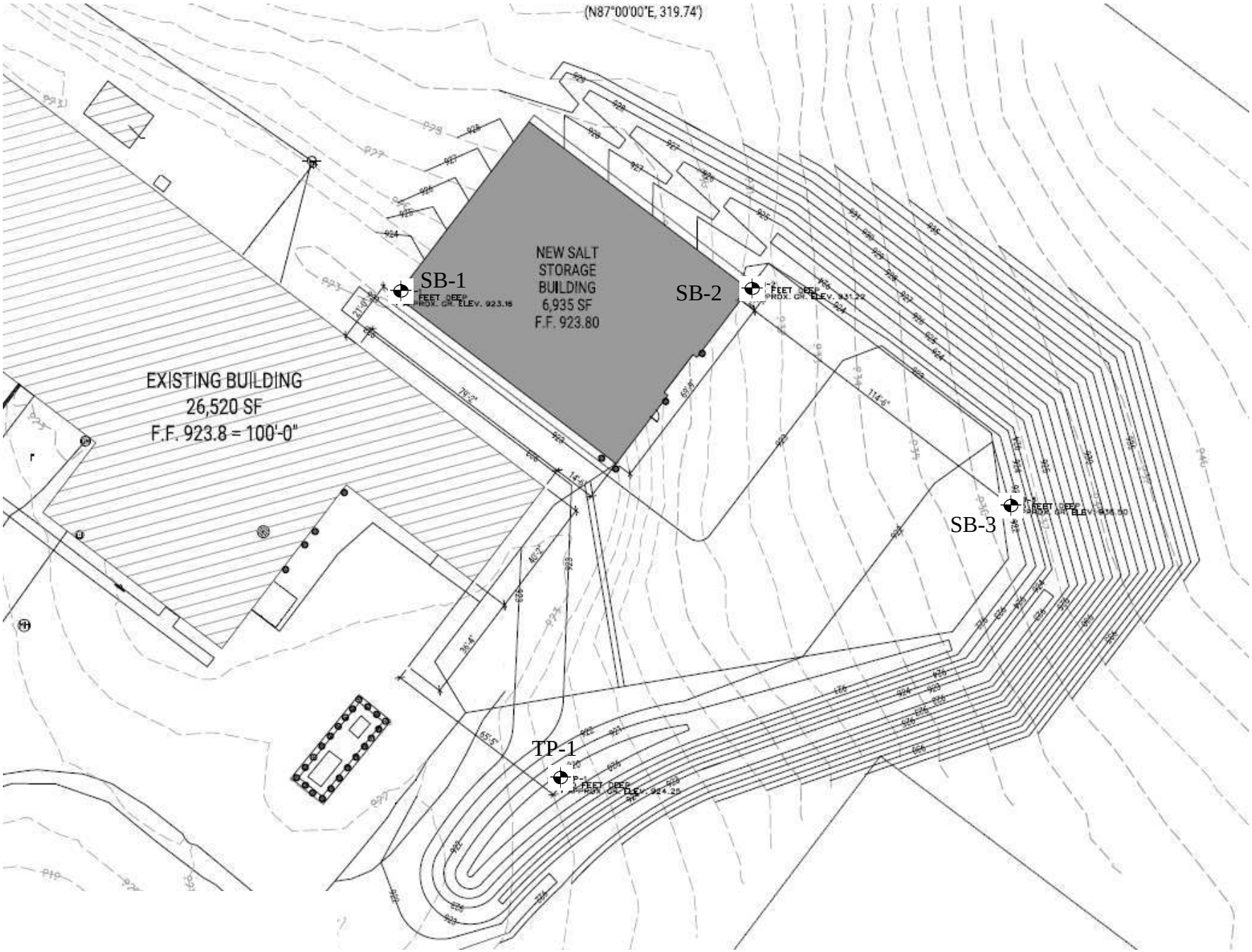
2. Standard Penetration Test and Split-Barrel Sampling of Soils
   (ASTM Designation: D 1586)

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

During the field exploration, the driller visually classified the soil and prepared a field log. *Field screening of the soil samples for possible environmental contaminants was not conducted by the drillers as environmental site assessment activities were not part of CGC's work scope.* Water level observations were made in each boring during and after drilling and are shown at the bottom of each boring log. Upon completion of drilling, the borings were backfilled with bentonite to satisfy WDNR regulations and the soil samples were delivered to our laboratory for visual classification. The soil samples 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 & TEST PIT LOCATION EXHIBIT
LOGS OF TEST BORINGS (3)
LOG OF TEST PIT (1)
LOG OF TEST BORING-GENERAL NOTES
UNIFIED SOIL CLASSIFICATION SYSTEM



Legend

Denotes Boring and Test Pit Location and Number.

Notes

1. Test pits excavated on August 30, 2022 by Rock County.
2. Soil borings performed September 19, 2022 by On-site Environmental.
3. Based map prepared by AYA.
4. Locations are approximate.

N

Scale: Reduced

Date: 09/2022 **Job No.** C22435	CGC, Inc.	**BORING & TEST PIT LOCATION EXHIBIT** **Salt Storage Building** **Orfordville, Rock County, WI**

CGC Inc.

LOG OF TEST BORING

Project: **Salt Storage Building**
734 West Beloit Street
Location: **Orfordville, WI**

Boring No. **SB-1**
Surface Elevation (ft) **923±**
Job No. **C22435**
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	LOI
						3± in. TOPSOIL (OL)					
1		10	M	8		Loose to Dense, Light Brown to Tan Silty Fine to Medium SAND, Some Gravel, Scattered Cobbles (SM)					
2		16	M	5	5						
3		18	M	13		Scattered Thin Silt Seams Below About 6 ft					
4		13	M	22	10						
5		5	M/W	48		Soils in Sample 5 Very Moist to Wet - Possible Perched Water					
6		24	M	15	20						
7		17	M	32							
					25	End of Boring at 25 ft					
						Backfilled with Soil Cuttings and Bentonite Chips					
					30						

WATER LEVEL OBSERVATIONS

While Drilling ▽ **NW** Upon Completion of Drilling **16'**
Time After Drilling _____ _____ _____ **(Perched)**
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 **9/19/22** End **9/19/22**
Driller **OSE** Chief **Gage** Rig **Geoprobe**
Logger **Gage** Editor **AJB** **7822DT**
Drill Method **3.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project: **Salt Storage Building**
734 West Beloit Street
Location: **Orfordville, WI**

Boring No. **SB-2**
Surface Elevation (ft) **931±**
Job No. **C22435**
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	LOI
						12± in. TOPSOIL (OL)					
1		3	M	18		Medium Dense, Dark Brown Clayey SAND, Little Gravel (SC)					
2		12	M	28	5	Medium Dense to Very Dense, Brown Fine to Coarse Gravelly SAND, Little to Some Silt, Scattered Cobbles (SP-SM/SM)					
3		13	M	36							
4		12	M	23	10						
5		15	M	43	15						
6		12	M	70	20						
7		13	M	43	25						
						End of Boring at 25 ft Backfilled with Soil Cuttings and Bentonite Chips					
					30						

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 **9/19/22** End **9/19/22**
Driller **OSE** Chief **Gage** Rig **Geoprobe**
Logger **Gage** Editor **AJB** **7822DT**
Drill Method **3.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST BORING

Project: **Salt Storage Building**
734 West Beloit Street
Location: **Orfordville, WI**

Boring No. **SB-3**
Surface Elevation (ft) **936±**
Job No. **C22435**
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	LOI
						12± in. TOPSOIL (OL)					
1		12	M	1		Stiff, Brown Lean CLAY, Trace Sand (CL)	(1.5)				
2		17	M	6	5	Very Loose to Loose, Light Brown to Tan Silty Fine to Medium SAND, Some Gravel, Scattered Cobbles (SM)					
3		17	M/W	3							
4		15	W	13	10	Medium Dense, Brown Fine to Medium SAND, Trace Silt, Little Gravel (SP) Probable Perched Water Near 8.5 ft					
5		7	M	33	15	Medium Dense to Dense, Light Brown to Tan Silty Fine to Medium SAND, Some Gravel, Scattered Cobbles (SM)					
6		19	M	41	20						
7		27	M	20	25						
					30	End of Boring at 25 ft Backfilled with Soil Cuttings and Bentonite Chips					

WATER LEVEL OBSERVATIONS

While Drilling ▽ **8.5'** Upon Completion of Drilling **NW**
Time After Drilling **(Perched)**
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 **9/19/22** End **9/19/22**
Driller **OSE** Chief **Gage** Rig **Geoprobe**
Logger **Gage** Editor **AJB** **7822DT**
Drill Method **3.25" HSA; Autohammer**

CGC Inc.

LOG OF TEST PIT

Project **Salt Storage Building**
734 West Beloit Street
Location **Orfordville, WI**

Pit No. **TP-1**
Surface Elevation **924±**
Job No. **C22435**
Sheet **1** of **1**

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

SAMPLE						VISUAL CLASSIFICATION and Remarks	SOIL PROPERTIES				
No.	TYPE	Rec (in.)	Moist	N	Depth (ft)		qu (qa) (tsf)	W	LL	PL	Probe (in.)
			M			12± in. Black Organic TOPSOIL (OL) *USDA: 10YR 2/2 Silt Loam*					
			M			Brown Sandy Lean CLAY (CL) *USDA: 10YR 4/4 Sandy Clay Loam*					
			M		5	Light Brown Fine SAND, Little to Some Silt with Scattered Thin Silt Seams (SP-SM/SM) *USDA: 10YR 7/4 Fine Sandy Loam with Scattered Thin Silt Loam Seams*					
			M			Brown SILT (ML) *USDA: 10YR 5/4 Silt Loam*					
			M		10	Light Brown Fine SAND, Little Silt with Scattered Thin Silt Seams (SP-SM) *USDA: 10YR 7/4 Fine Sandy Loam with Scattered Thin Silt Loam Seams*					
					15	End Test Pit at 10.5± ft Excavation Backfilled with Spoils Upon Completion.					

WATER LEVEL OBSERVATIONS

While Excavating ▽ **NW** Upon Completion of Drilling _____
Time After Excavating _____
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 **8/30/22** End **8/30/22**
Driller **Rock CTY** Chief _____
Logger **AJB** Editor **AJB**
Equip. Used: **Tracked Excavator**

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

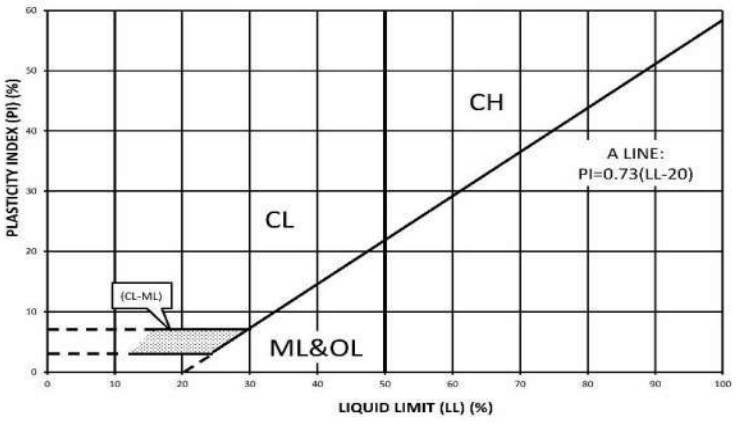
LABORATORY CLASSIFICATION CRITERIA

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.

Modified and reprinted with permission from:

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

APPENDIX D

RECOMMENDED COMPACTED FILL SPECIFICATIONS

APPENDIX D

CGC, INC.

RECOMMENDED COMPACTED FILL SPECIFICATIONS

General Fill Materials

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

Special Fill Materials

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

Placement Method

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

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

Compaction Specifications

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

Testing Procedures

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

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

Table 1
Gradation of Special Fill Materials

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

Notes:

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

Table 2
Compaction Guidelines

Area	Percent Compaction (1)	
	Clay/Silt	Sand/Gravel
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)

APPENDIX E

WISCONSIN DEPARTMENT OF SAFETY & PROFESSIONAL SERVICES
***SOIL AND SITE EVALUATION – STORM* FORM**

Division of Industry Services
P.O. Box 2658
Madison, Wisconsin 53701

Attachment 2:

SOIL AND SITE EVALUATION - STORM

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

Attach a complete site plan on paper not less than 8 ½ x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent of slope, scale or dimensions, north arrow, and BM referenced to nearest road

Please print all information

Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m)]

County: *Rock*

Parcel I.D.: *6-24-261.2*

Reviewed by:

Date:

Property Owner: *Rock County*

Property Location: Govt. Lot *NW ¼ SW ¼* S *13* T *2* R *10* E

Property Owner's Mail Address: *3715 N Newville Road*

Lot #:

Block#:

Subd. Name or CSM #:

City: *Janesville* State: *WI* Zip Code: *53545* Phone Number:

[ ] City [x] Village [ ] Town: *Orfordville*

Nearest Road: *734 W Beloit Street*

Drainage area: _____ [ ] sq ft [ ] acres

Test site suitable for (check all that apply): [ ] Site not suitable;

[ ] Bioretention; [ ] Subsurface Disperal System;

[ ] Reuse; [ ] Irrigation; [ ] Other _____

Hydraulic Application Test Method

[X] Morphological Evaluation

[ ] Double Ring Infiltrometer

[ ] Other: (specify) _____

Soil Moisture
Date of borings: 8/30/2022

USDA-NRCS WETS Value:

[ ] Dry = 1;

[ ] Normal = 2;

[ ] Wet = 3.

TP-1 #OBS. [x] Pit [ ] Boring Ground surface elevation 924 ft. +/- Elevation of limiting factor below 913.5 ft.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frags.	% Fines (P200)	Hydraulic App Rate Inches/Hr
1	0-12	10YR 2/2	None	SIL	1msbk	mfr		<5		0.13
2	12-57	10YR 4/4	None	SCL	0m	mvfi		<5		0.11
3	57-104	10YR 7/4	None	FSL, SIL	0sg	ml		5		0.13-0.5 (1)
4	104-118	10YR 5/4	None	SIL	1mabk	mfr		<5		0.13
5	118-126	10YR 7/4	None	FSL, SIL	0sg	ml		5		0.13-0.5 (1)

Comments: Groundwater not encountered during or shortly after excavation. (1) Silt loam seams will limit infiltration potential of Layer 3 and 5. Infiltration potential can potentially be improved if this layer is excavated and turned over/blended to break up silt thin loam seams. Gradations during construction are recommended to document blended soil classification.

Name (Please Print): Alex Bina

Signature: Alex Bina

Credential Number: **111802008**

Address: 403 6th Street, Waunakee, WI

Date Evaluation Conducted: **8/30/2022**

Telephone Number: 608-288-4100