HIGHWAY WORK PROPOSAL

Wisconsin Department of Transportation
DT1502 01/2020 s.66.0901(7) Wis. Stats

Proposal Number: 010

STATE ID	FEDERAL ID	PROJECT DESCRIPTION	HIGHWAY	COUNTY
1130-65-88	N/A	Appleton - De Pere, Salt Storage Facility	NON HWY	Outagamie

This proposal, submitted by the undersigned bidder to the Wisconsin Department of Transportation, is in accordance with the advertised request for proposals. The bidder is to furnish and deliver all materials, and to perform all work for the improvement of the designated project in the time specified, in accordance with the appended Proposal Requirements and Conditions.

Proposal Guaranty Required: $75,000.00 Payable to: Wisconsin Department of Transportation	Attach Proposal Guaranty on back of this PAGE.
Bid Submittal Date: June 10, 2025 Time (Local Time): 11:00 am	Firm Name, Address, City, State, Zip Code **SAMPLE** **NOT FOR BIDDING PURPOSES**
Contract Completion Time October 15, 2026	
Assigned Disadvantaged Business Enterprise Goal 0%	This contract is exempt from federal oversight.

This certifies that the undersigned bidder, duly sworn, is an authorized representative of the firm named above; that the bidder has examined and carefully prepared the bid from the plans, Highway Work Proposal, and all addenda, and has checked the same in detail before submitting this proposal or bid; and that the bidder or agents, officer, or employees have not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with this proposal bid.

Do not sign, notarize, or submit this Highway Work Proposal when submitting an electronic bid on the Internet.

Subscribed and sworn to before me this date _____

(Signature, Notary Public, State of Wisconsin)	(Bidder Signature)
(Print or Type Name, Notary Public, State Wisconsin)	(Print or Type Bidder Name)
(Date Commission Expires)	(Bidder Title)

Notary Seal

For Department Use Only

Type of Work:
Grading, Aggregate, Asphalt Pavement, Storm Sewer, Erosion Control, Traffic Control, Restoration, Salt Storage Building.

Notice of Award Dated	Date Guaranty Returned

PLEASE ATTACH
PROPOSAL GUARANTY HERE

PROPOSAL REQUIREMENTS AND CONDITIONS

The bidder, signing and submitting this proposal, agrees and declares as a condition thereof, to be bound by the following conditions and requirements.

If the bidder has a corporate relationship with the proposal design engineering company, the bidder declares that it did not obtain any facts, data, or other information related to this proposal from the design engineering company that was not available to all bidders.

The bidder declares that they have carefully examined the site of, and the proposal, plans, specifications and contract forms for the work contemplated, and it is assumed that the bidder has investigated and is satisfied as to the conditions to be encountered, as to the character, quality, and quantities of work to be performed and materials to be furnished, and as to the requirements of the specifications, special provisions and contract. It is mutually agreed that submission of a proposal shall be considered conclusive evidence that the bidder has made such examination.

The bidder submits herewith a proposal guaranty in proper form and amount payable to the party as designated in the advertisement inviting proposals, to be retained by and become the property of the owner of the work in the event the undersigned shall fail to execute the contract and contract bond and return the same to the office of the engineer within fourteen (14) days after having been notified in writing to do so; otherwise to be returned.

The bidder declares that they understand that the estimate of quantities in the attached schedule is approximate only and that the attached quantities may be greater or less in accordance with the specifications.

The bidder agrees to perform the said work, for and in consideration of the payment of the amount becoming due on account of work performed, according to the unit prices bid in the following schedule, and to accept such amounts in full payment of said work.

The bidder declares that all of the said work will be performed at their own proper cost and expense, that they will furnish all necessary materials, labor, tools, machinery, apparatus, and other means of construction in the manner provided in the applicable specifications and the approved plans for the work together with all standard and special designs that may be designed on such plans, and the special provisions in the contract of which this proposal will become a part, if and when accepted. The bidder further agrees that the applicable specifications and all plans and working drawings are made a part hereof, as fully and completely as if attached hereto.

The bidder, if awarded the contract, agrees to begin the work not later than ten (10) days after the date of written notification from the engineer to do so, unless otherwise stipulated in the special provisions.

The bidder declares that if they are awarded the contract, they will execute the contract agreement and begin and complete the work within the time named herein, and they will file a good and sufficient surety bond for the amount of the contract for performance and also for the full amount of the contract for payment.

The bidder, if awarded the contract, shall pay all claims as required by Section 779.14, Statutes of Wisconsin, and shall be subject to and discharge all liabilities for injuries pursuant to Chapter 102 of the Statutes of Wisconsin, and all acts amendatory thereto. They shall further be responsible for any damages to property or injury to persons occurring through their own negligence or that of their employees or agents, incident to the performance of work under this contract, pursuant to the Standard Specifications for Road and Bridge Construction applicable to this contract.

In connection with the performance of work under this contract, the contractor agrees to comply with all applicable state and federal statutes relating to non-discrimination in employment. No otherwise qualified person shall be excluded from employment or otherwise be subject to discrimination in employment in any manner on the basis of age, race, religion, color, gender, national origin or ancestry, disability, arrest or conviction record (in keeping with s.111.32), sexual orientation, marital status, membership in the military reserve, honesty testing, genetic testing, and outside use of lawful products. 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 ensure equal opportunity in employment to all applicants and employees and to take affirmative action to attain a representative workforce.

The contractor agrees to post notices and posters setting forth the provisions of the nondiscrimination clause, in a conspicuous and easily accessible place, available for employees and applicants for employment.

If a state public official (section 19.42, Stats.) or an organization in which a state public official holds at least a 10% interest is a party to this agreement, this contract is voidable by the state unless appropriate disclosure is made to the State of Wisconsin Ethics Board.

BID PREPARATION

Preparing the Proposal Schedule of Items

A. General

(1) Obtain bidding proposals as specified in section 102 of the standard specifications prior to 11:45 AM of the last business day preceding the letting. Submit bidding proposals using one of the following methods:

1. Electronic bid on the internet.
2. Electronic bid on a printout with accompanying diskette or CD ROM.
3. Paper bid under a waiver of the electronic submittal requirements.

(2) Bids submitted on a printout with accompanying diskette or CD ROM or paper bids submitted under a waiver of the electronic submittal requirements govern over bids submitted on the internet.

(3) The department will provide bidding information through the department's web site at:

https://wisconsindot.gov/Pages/doing-bus/contractors/hcci/bid-let.aspx

The contractor is responsible for reviewing this web site for general notices as well as information regarding proposals in each letting. The department will also post special notices of all addenda to each proposal through this web site no later than 4:00 PM local time on the Thursday before the letting. Check the department's web site after 5:00 PM local time on the Thursday before the letting to ensure all addenda have been accounted for before preparing the bid. When bidding using methods 1 and 2 above, check the Bid Express™ on-line bidding exchange at http://www.bidx.com/ after 5:00 PM local time on the Thursday before the letting to ensure that the latest schedule of items Expedite file (*.ebs or *.00x) is used to submit the final bid.

(4) Interested parties can subscribe to the Bid Express™ on-line bidding exchange by following the instructions provided at the www.bidx.com web site or by contacting:

Info Tech Inc.
5700 SW 34th Street, Suite 1235
Gainesville, FL 32608-5371
email: mailto:customer.support@bidx.com

(5) The department will address equipment and process failures, if the bidder can demonstrate that those failures were beyond their control.

(6) Contractors are responsible for checking on the issuance of addenda and for obtaining the addenda. Notice of issuance of addenda is posted on the department's web site at:

https://wisconsindot.gov/Pages/doing-bus/contractors/hcci/bid-let.aspx

or by calling the department at (608) 266-1631. Addenda can ONLY be obtained from the department's web site listed above or by picking up the addenda at the Bureau of Highway Construction, 4th floor, 4822 Madison Yards Way, Madison, WI, during regular business hours.

(7) Addenda posted after 5:00 PM on the Thursday before the letting will be emailed to the eligible bidders for that proposal. All eligible bidders shall acknowledge receipt of the addenda whether they are bidding on the proposal or not. Not acknowledging receipt may jeopardize the awarding of the project.

B. Submitting Electronic Bids

B.1 On the Internet

(1) Do the following before submitting the bid:

4. Have a properly executed annual bid bond on file with the department.
5. Have a digital ID on file with and enabled by Info Tech Inc. Using this digital ID will constitute the bidder's signature for proper execution of the bidding proposal.

(2) In lieu of preparing, delivering, and submitting the proposal as specified in 102.6 and 102.9 of the standard specifications, submit the proposal on the internet as follows:

1. Download the latest schedule of items reflecting all addenda from the Bid Express™ web site.
2. Use Expedite™ software to enter a unit price for every item in the schedule of items.
3. Submit the bid according to the requirements of Expedite™ software and the Bid Express™ web site. Do not submit a bid on a printout with accompanying diskette or CD ROM or a paper bid. If the bidder does submit a bid on a printout with accompanying diskette or a paper bid in addition to the internet submittal, the department will disregard the internet bid
4. Submit the bid before the hour and date the Notice to Contractors designates
5. Do not sign, notarize, and return the bidding proposal described in 102.2 of the standard specifications.

(3) The department will not consider the bid accepted until the hour and date the Notice to Contractors designates.

B.2 On a Printout with Accompanying Diskette or CD ROM

(1) Download the latest schedule of items from the Wisconsin pages of the Bid Express web site reflecting the latest addenda posted on the department's web site at:

https://wisconsindot.gov/Pages/doing-bus/contractors/hcci/bid-let.aspx

Use Expedite™ software to prepare and print the schedule of items. Provide a valid amount for all price fields. Follow instructions and review the help screens provided on the Bid Express™ web site to assure that the schedule of items is prepared properly.

(2) Staple an 8 1/2 by 11 inch printout of the Expedite□□ generated schedule of items to the other proposal documents submitted to the department as a part of the bidder's sealed bid. As a separate submittal, not in the sealed bid envelop but due at the same time and place as the sealed bid, also provide the Expedite™ generated schedule of items on a 3 1/2 inch computer diskette or CD ROM. Label each diskette or CD ROM with the bidder's name, the 4 character department-assigned bidder identification code from the top of the bidding proposal, and a list of the proposal numbers included on that diskette or CD ROM as indicated in the following example:

Bidder Name
BN00
Proposals: 1, 12, 14, & 22

(3) If bidding on more than one proposal in the letting, the bidder may include all proposals for that letting on one diskette or CD ROM. Include only submitted proposals with no incomplete or other files on the diskette or CD ROM.

(4) The bidder-submitted printout of the Expedite□□ generated schedule of items is the governing contract document and must conform to the requirements of section 102 of the standard specifications. If a printout needs to be altered, cross out the printed information with ink or typewriter and enter the new information and initial it in ink. If there is a discrepancy between the printout and the diskette or CD ROM, the department will analyze the bid using the printout information.

(5) In addition to the reasons specified in section 102 of the standard specifications, proposals are irregular and the department may reject them for one or more of the following:

1. The check code printed on the bottom of the printout of the Expedite™ generated schedule of items is not the same on each page.
2. The check code printed on the printout of the Expedite™ generated schedule of items is not the same as the check code for that proposal provided on the diskette or CD ROM.
3. The diskette or CD ROM is not submitted at the time and place the department designates.

B Waiver of Electronic Submittal

(1) The bidder may request a waiver of the electronic submittal requirements. Submit a written request for a waiver in lieu of bids submitted on the internet or on a printout with accompanying diskette or CD ROM. Use the waiver that was included with the paper bid document sent to the bidder or type up a waiver on the bidder's letterhead. The department will waive the electronic submittal requirements for a bidding entity (individual, partnership, joint venture, corporation, or limited liability company) for up to 4 individual proposals in a calendar year. The department may allow additional waivers for equipment malfunctions.

(2) Submit a schedule of items on paper conforming to section 102 of the standard specifications. The department charges the bidder a $75 administrative fee per proposal, payable at the time and place the department designates for receiving bids, to cover the costs of data entry. The department will accept a check or money order payable to: "Wisconsin, Dept. of Transportation."

(3) In addition to the reasons specified in section 102 of the standard specifications, proposals are irregular and the department may reject them for one or more of the following:

1. The bidder fails to provide the written request for waiver of the electronic submittal requirements.
2. The bidder fails to pay the $75 administrative fee before the time the department designates for the opening of bids unless the bidder requests on the waiver that they be billed for the $75.
3. The bidder exceeds 4 waivers of electronic submittal requirements within a calendar year.

(4) In addition to the reasons specified in section 102 of the standard specifications, the department may refuse to issue bidding proposals for future contracts to a bidding entity that owes the department administrative fees for a waiver of electronic submittal requirements.

PROPOSAL BID BOND

Wisconsin Department of Transportation

DT1303 1/2006

Proposal Number	Project Number	Letting Date
Name of Principal		
Name of Surety	State in Which Surety is Organized	

We, the above-named Principal and the above-named Surety, are held and firmly bound unto the State of Wisconsin in the sum equal to the Proposal Guaranty for the total bid submitted for the payment to be made; we jointly and severally bind ourselves, our heirs, executors, administrators, successors and assigns. The condition of this obligation is that the Principal has submitted a bid proposal to the State of Wisconsin acting through the Department of Transportation for the improvement designated by the Proposal Number and Letting Date indicated above.

If the Principal is awarded the contract and, within the time and manner required by law after the prescribed forms are presented for signature, enters into a written contract in accordance with the bid, and files the bond with the Department of Transportation to guarantee faithful performance and payment for labor and materials, as required by law, or if the Department of Transportation shall reject all bids for the work described, then this obligation shall be null and void; otherwise, it shall be and remain in full force and effect. In the event of failure of the Principal to enter into the contract or give the specified bond, the Principal shall pay to the Department of Transportation **within 10 business days of demand** a total equal to the Proposal Guaranty as liquidated damages; the liability of the Surety continues for the full amount of the obligation as stated until the obligation is paid in full.

The Surety, for value received, agrees that the obligations of it and its bond shall not be impaired or affected by any extension of time within which the Department of Transportation may accept the bid; and the Surety does waive notice of any such extension.

IN WITNESS, the Principal and Surety have agreed and have signed by their proper officers and have caused their corporate seals to be affixed this date: **(DATE MUST BE ENTERED)**

PRINCIPAL

(Company Name) **(Affix Corporate Seal)**

(Signature and Title)

(Company Name)

(Signature and Title)

(Company Name)

(Signature and Title)

(Company Name)

(Signature and Title)

(Name of Surety) **(Affix Seal)**

(Signature of Attorney-in-Fact)

NOTARY FOR PRINCIPAL

(Date)

State of Wisconsin)
) ss.
_____ County)

On the above date, this instrument was acknowledged before me by the named person(s).

(Signature, Notary Public, State of Wisconsin)

(Print or Type Name, Notary Public, State of Wisconsin)

(Date Commission Expires)

Notary Seal

NOTARY FOR SURETY

(Date)

State of Wisconsin)
) ss.
_____ County)

On the above date, this instrument was acknowledged before me by the named person(s).

(Signature, Notary Public, State of Wisconsin)

(Print or Type Name, Notary Public, State of Wisconsin)

(Date Commission Expires)

Notary Seal

IMPORTANT: A certified copy of Power of Attorney of the signatory agent must be attached to the bid bond.

CERTIFICATE OF ANNUAL BID BOND

Wisconsin Department of Transportation

DT1305 8/2003

Time Period Valid (From/To)
Name of Surety
Name of Contractor
Certificate Holder Wisconsin Department of Transportation

This is to certify that an annual bid bond issued by the above-named Surety is currently on file with the Wisconsin Department of Transportation.

This certificate is issued as a matter of information and conveys no rights upon the certificate holder and does not amend, extend or alter the coverage of the annual bid bond.

Cancellation: Should the above policy be cancelled before the expiration date, the issuing surety will give thirty (30) days written notice to the certificate holder indicated above.

(Signature of Authorized Contractor Representative) (Date)

Effective with March 2010 Letting

LIST OF SUBCONTRACTORS

Section 66.0901(7), Wisconsin Statutes, provides that as a part of the proposal, the bidder also shall submit a list of the subcontractors the bidder proposes to contract with and the class of work to be performed by each. In order to qualify for inclusion in the bidder's list a subcontractor shall first submit a bid in writing, to the general contractor at least 48 hours prior to the time of the bid closing. The list may not be added to or altered without the written consent of the municipality. A proposal of a bidder is not invalid if any subcontractor and the class of work to be performed by the subcontractor has been omitted from a proposal; the omission shall be considered inadvertent or the bidder will perform the work personally.

No subcontract, whether listed herein or later proposed, may be entered into without the written consent of the Engineer as provided in Subsection 108.1 of the Standard Specifications.

Name of Subcontractor	Class of Work	Estimated Value

CERTIFICATION REGARDING DEBARMENT, SUSPENSION, AND OTHER RESPONSIBILITY MATTERS - PRIMARY COVERED TRANSACTIONS

Instructions for Certification

1. By signing and submitting this proposal, the prospective contractor is providing the certification set out below.

2. The inability of a person to provide the certification required below will not necessarily result in denial of participation in this covered transaction. The prospective contractor shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective contractor to furnish a certification or an explanation shall disqualify such person from participation in this transaction.

3. The certification in this clause is a material representation of fact upon which reliance was placed when the department determined to enter into this transaction. If it is later determined that the contractor knowingly rendered an erroneous certification in addition to other remedies available to the Federal Government the department may terminate this transaction for cause or default.

4. The prospective contractor shall provide immediate written notice to the department to whom this proposal is submitted if at any time the prospective contractor learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

5. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Order 12549. You may contact the department to which this proposal is being submitted for assistance in obtaining a copy of those regulations.

6. The prospective contractor agrees by submitting this proposal that, should this contract be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department entering into this transaction.

7. The prospective contractor further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," which is included as an addendum to PR- 1273 - "Required Contract Provisions Federal Aid Construction Contracts," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.

8. The contractor may rely upon a certification of a prospective subcontractor/materials supplier that it is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A contractor may decide the method and frequency by which it determines the eligibility of its principals. Each contractor may, but is not required to, check the Disapproval List (telephone # 608/266/1631).

9. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a contractor is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

10. Except for transactions authorized under paragraph 6 of these instructions, if a contractor in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department may terminate this transaction for cause or default.

Certification Regarding Debarment, Suspension, and Other Responsibility Matters - Primary Covered Transactions

1. The prospective contractor certifies to the best of its knowledge and belief, that it and its principals:

   (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency;

   (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements or receiving stolen property;

   (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offense enumerated in paragraph (1)(b) of this certification; and

   (d) Have not within a three-year period preceding this proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

2. Where the prospective contractor is unable to certify to any of the statements in this certification, such prospective contractor shall attach an explanation to this proposal.

Special Provisions

Table of Contents

1. Administrative.

1.1 General.

Perform the work under this construction contract for Project ID 1130-65-88, Appleton-De Pere, Salt Storage Facility, IH 41, Outagamie County, Wisconsin as the plans show and execute the work as specified in the State of Wisconsin, Department of Transportation, Standard Specifications for Highway and Structure Construction, 2025 Edition, as published by the department, and these special provisions.

If all or a portion of the plans and special provisions are developed in the SI metric system and the schedule of prices is developed in the US standard measure system, the department will pay for the work as bid in the US standard system.

100-005 (20250108)

1.2 Scope of Work.

The work under this contract shall consist of grading, prefabricated vertical drains, base aggregate dense, select crushed material, asphaltic surface, salt storage structure, traffic control, erosion control, finishing items and all incidental items necessary to complete the work as shown on the plans and included in the proposal and contract.

104-005 (20090901)

1.3 Waiving Bidder Prequalification.

Bidder prequalification is not required; however, prior to awarding a contract, the department may require the bidder to produce financial documentation similar to the prequalification statement (DT1621) and evidence that they have a history of performing work of a similar character in a satisfactory manner.

1.4 Other Contracts.

The following projects will be under construction concurrently with the work under this contract. Coordinate trucking activities, detours, work zone traffic control, roadway and lane closures, and other work items as required with other contracts.

IH 41, Project ID 1130-63-72: Appleton – De Pere, IH Corridor Smart Work Zone in Outagamie County. Proposed work includes installation and maintenance of Smart Work Zone equipment on IH 41, IH 41 exit ramps, WIS 441 NB south of IH 41, and the STH 441 ramps between the Southern IH 41/US 10/WIS 441 Interchange and the WIS 172 Interchange in Green Bay. Work under this contract is anticipated to begin in April 2025. Coordinate activities with Project ID 1130-63-72.

IH 41, Project ID 1130-64-71/72/87: Appleton – De Pere, STH 96 to Lynndale Drive in Outagamie County. Proposed work includes widening of northbound IH 41, reconstruction of southbound IH 41 and replacement of IH 41 bridges over the Fox Valley & Lake Superior railroad. Work under this contract is anticipated to begin in March 2025, with completion anticipated in November 2025. The IH 41/STH 96 southbound interchange exit ramp will be closed during construction with a posted detour route following STH 15 to CTH CB. The IH 41/STH 15 southbound entrance and northbound exit interchange ramps will be closed during construction with a posted detour route following STH 96 to CTH CB (west) or Lynndale Drive (east). The IH 41/STH 96 northbound entrance interchange ramp will be closed during construction with a posted detour route following Lynndale Drive to Northland Avenue. There is no anticipated impact to this contract.

IH 41, Project ID 1130-64-73: Appleton – De Pere, Lynndale - Meade in Outagamie County. Proposed work includes reconstruction of IH 41 from Lynndale Drive/CTH A to Meade Street. Work under this contract is anticipated to begin in July 2025, with completion anticipated in October 2027. IH 41 will have limited night closures with detour routes utilizing STH 441 for regional traffic and STH 96 to STH 47 for local traffic. Gillett Street will have limited closures in 2026 and a full closure in 2027. No detour will be signed. There is no anticipated impact to this contract.

IH 41, Project ID 1130-64-77: Appleton - De Pere, Richmond St (WIS 47) Intchg & Gillett St in Outagamie County. Proposed work includes reconstruction of the Richmond Street interchange and

Gillett Street. Work under this contract is anticipated to begin in July 2025, with completion anticipated in November 2025.

IH 41, Project ID 1130-64-76: Appleton – De Pere, Northland/WIS 15 Intchg B440315/16 in Outagamie County. Proposed work includes reconstruction of the IH 41/STH 15 interchange including replacement of the STH 15 bridges over IH 41 and pavement widening along IH 41. Work under this contract is anticipated to begin in November 2024, with completion anticipated in September 2025. STH 15 will be closed during construction with a posted detour route following CTH CB, STH 96, and CTH A. Lane closures will be used on IH 41. There is no anticipated impact to this contract.

IH 41, Project ID 1130-65-76: Appleton – De Pere, Ballard Rd (CTH E) Intchg in Outagamie County. Proposed work includes reconstruction of the IH 41/Ballard Road (CTH E) interchange including the replacement of the Ballard Road (CTH E) bridges over IH 41 Work under this contract is anticipated to begin in April 2025, with completion anticipated in November 2025. Ballard Road (CTH E) and the Ballard Road interchange ramps will be closed during construction with posted detour routes following STH 47 and CTH JJ and STH 441 and CTH OO. There is no anticipated impact to this contract.

IH 41, Project ID 1130-66-78: Appleton – De Pere, CTH J Interchange in Outagamie County. Proposed work includes reconstruction of CTH J interchange, including replacement of structure over IH 41. Work under this contract is anticipated to begin in May 2025, with completion anticipated in October 2025. CTH J will be closed to through traffic during construction. There is no anticipated impact to this contract.

IH 41, Project ID 1130-66-81: Appleton – De Pere, Vandenbroek Rd Overpass in Outagamie County. Proposed work includes reconstruction of Vandenbroek Road including replacement of structure over IH 41 Work under this contract is anticipated to begin in July 2025, with completion anticipated in October 2025. Vandenbroek Road will be closed to through traffic during construction with no posted detour route. There is no anticipated impact to this contract.

IH 41, Project ID 1130-66-82: Appleton – De Pere, Buchanan Street Overpass in Outagamie County. Proposed work includes reconstruction of Buchanan Street including replacement of structure over IH 41 Work under this contract is anticipated to begin in April 2026, with completion anticipated in November 2026. Buchanan Street will be closed to through traffic during construction. There is no anticipated impact to this contract.

IH 41, Project ID 1130-67-71: Appleton – De Pere, CTH JJ to Miners Way TMP in Outagamie and Brown Counties. Proposed work includes roadway widening on IH 41. Work under this contract is anticipated to begin in March 2025, with completion anticipated in December 2025. Nighttime shoulder widening is anticipated. Coordinate activities with Project ID 1130-67-71.

IH 41, Project ID 1130-67-72: Appleton – De Pere, CTH JJ to Miners Way TMP in Outagamie and Brown Counties. Proposed work includes reconstruction of IH 41. Work under this contract is anticipated to begin in July 2025, with completion anticipated in November 2027.

IH 41, Project ID 1130-67-76/86: Appleton – De Pere, S County Line Rd (CTH U) Intchg and CTH U Frontage Roads in Outagamie and Brown Counties. Proposed work includes reconstruction of the IH 41/S County Line Road (CTH U) interchange and adjacent frontage roads. Work under this contract is anticipated to begin in July 2025, with completion anticipated in November 2025. There is no anticipated impact to this contract.

Southbridge Interchange, Project ID 1130-68-77/81: Appleton - De Pere, Southbridge Interchange and Southbridge Interchange Frontage Roads in Brown County. Proposed work includes reconstruction of the IH 41/Southbridge Road interchange and adjacent frontage road reconstruction. Work under this contract is anticipated to begin in July 2025, with completion anticipated in November 2025.

ner41-105 (12052023)

1.5 Notice to Contractor – Safety and Personnel Identification Program.

All workers shall wear OSHA and ANSI compliant safety head protection, safety glasses, safety-toe protective footwear, and safety vest at all times while within the project footprint. All workers shall wear OSHA and ANSI compliant safety pants within the right of way of a roadway with a posted speed limit of 50 mph or greater unless separated from traffic by positive protection (e.g., temporary concrete barrier). From dusk to dawn, all workers shall wear OSHA and ANSI compliant safety pants.

The prime contractor shall provide a copy of their current Company Safety Plans to the department 7 days prior to the preconstruction meeting. All workers shall comply with the Safety Plans of their employer.

All contractor personnel will be required to register in the program prior to performing work. Valid photo identification which includes unexpired driver's license, government issued identification cards, military identification, passport, or other identification approved by the department will be required to register. All personnel registered will be issued a hard hat sticker with an identification number by the department. Stickers shall be placed in a visible location on the hard hat. Register at the IH 41 corridor field office during normal business hours.

Noncompliance with this contract provision may result in removal of contractor personnel from the project or suspension of work according to standard spec 108.6 applicable under the contract.

ner41-108 (05072024)

1.6 Field Facilities.

The department will provide primary field facilities for this project located at 3600 Commerce Court, Appleton, WI 54911.

The contractor is required to schedule and attend all meetings at the department provided field office facility. Formal meetings, unless otherwise specified, will not be scheduled at any offsite locations other than the field facility provided by the department.

ner41-105 (12052023)

2. Prosecution and Progress.

2.1 Prosecution and Progress.

Begin work within 10 calendar days after the engineer issues a written notice to do so.

Provide the start date to the engineer in writing within a month after executing the contract but at least 14 calendar days before the preconstruction conference. Upon approval, the engineer will issue the notice to proceed within ten calendar days before the approved start date.

To revise the start date, submit a written request to the engineer at least two weeks before the intended start date. The engineer will approve or deny that request based on the conditions cited in the request and its effect on the department's scheduled resources.

All work described within Stage 1 shall be completed by September 5, 2025. Upon completion of Stage 1, allow for a 6 month surcharge fill settlement period. Do not begin Stage 2 work until surcharge settlement has been verified by the engineer.

Construction Overview

This information is included to assist the contractor and its subcontractors; do not interpret this information as a demonstration of specified means and methods. Coordinate the Schedule of operations for the construction staging as shown in the plans and as noted in these special provisions. Do not move operations ahead withing the proposed construction staging unless modifications to the staging and schedule are approved in writing by the engineer. Staging modifications shall address traffic and construction.

Stage 1

- Complete installation of drainage blanket, vertical drains, settlement gauges, and vibrating wire instrumentation system.
- Complete placement of surcharge fill.
- Complete stage 1 site and ditch grading.
- Complete placement of stage 1 erosion control and seeding.

Settlement Shutdown

- 6-month shutdown will commence with the completion of placement of surcharge fill and erosion control during Stage 1 no later than September 5, 2025. Do not resume other work until surcharge settlement has been verified by the engineer.

Stage 2

- Removal of surcharge fill.

- Complete Stage 2 site and ditch grading.
- Construction of precast salt storage building.
- Complete placement of pavement structure.
- Complete placement of erosion control and finishing.

2.2 Environmental Protection, Northern Long Eared Bat.

Northern long-eared bats (NLEB) have the potential to inhabit the project limits because they roost in trees, bridges and culverts. Roosts may not have been observed on this project, but conditions to support the species exist. The species and all active roosts are protected by the federal Endangered Species Act. If an individual bat or active roost is encountered during construction operations, stop work, and notify the engineer and the WisDOT Region Environmental Coordinator (REC).

Ensure all operators, employees, and subcontractors working in areas of known or presumed bat habitat are aware of environmental commitments and avoidance and minimization measures (AMMs) to protect both bats and their habitat.

Avoidance and Minimization Measures (AMMs) for Northern Long Eared Bat (NLEB) and Tri Colored Bat (TCB) include:

General AMM

1. Ensure all operators, employees, and contractors working in areas of known or presumed bat habitat are aware of all FHWA and the department environmental commitments, including all applicable AMMs.

Lighting AMM

1. Direct temporary lighting away from suitable habitat during the active season.

Tree Removal AMM

1. Apply time of year restrictions for tree removal, November 1 to March 31 of the calendar year.
2. Ensure tree removal is limited to that specified in the plans. Clearing limits shall be marked in the field by the engineer (e.g., install bright colored flagging/fencing prior to any tree clearing to ensure contractors stay within clearing limits).

Bridge AMM

1. If bridge assessment or P/A surveys suggest presence of a small number of bats (<5 – not a colony), and work is conducted during the active season, the following types of bridge work can generally be conducted with the presence of bats:
    a. Above deck work where construction equipment or materials do not extend to the underside of deck where bats may be located (e.g., materials that may drip down to underside of deck) and does not include percussives (vibration) or noise levels above general traffic (e.g., road line painting, wing-wall work). Below deck work that is conducted away from roosting bats and does not involve percussives or noise level above general traffic (e.g., wing-wall work, some abutment, beam end, scour, or pier repair).
    b. Any other bridge repair, retrofit, maintenance, and/or rehabilitation (which may include activities with percussives) conducted in the evening while the bats are feeding, starting one hour after sunset, and ending one hour before daylight excluding the hours between 10 p.m. and midnight and keep the lighting localized to the work operation.

Reasonable and Prudent Measures (RPMs) the following RPMs are necessary and appropriate to minimize impacts of incidental take of bats:

1. The department will ensure that all of the AMMs are implemented.
    a. Notify contractors and construction staff of conservation measures and ensure compliance with these measures.
    b. Bridge/culvert surveys for bats will be conducted by the department a minimum of 24 months before construction activities begin. Construction activities should not begin until after appropriate agencies have been notified of survey results (if not already on-site during the survey).

c. Only individuals with authorization to capture bats will capture and handle bats.

d. If any AMMs cannot be implemented or require modification, contact the engineer and REC for further discussion before proceeding with work.

2. The contractor will ensure that appropriate agencies are notified of construction initiation and completion dates, as well as any unforeseen circumstances.

   a. Notify WisDOT REC Rachel Weber via email (rachel.weber@dot.wi.gov) or current REC when construction is expected to begin.

   b. Provide contact information for WisDOT REC Rachel Weber or current REC to appropriate on-site staff so the department can immediately notify agencies of any unforeseen or emergency circumstances or request clarification regarding conservation measures or terms and conditions.

   c. Notify WisDOT Regional Environmental Coordinator Rachel Weber via email (rachel.weber@dot.wi.gov) or current REC when construction is complete.

3. Should a dead or injured bat be found during project activities; all contractors will ensure that construction activities cease immediately and that the engineer is notified.

   a. Cease all construction activities if a dead or injured bat is found during project activities and immediately notify the engineer and WisDOT REC Rachel Weber via email (rachel.weber@dot.wi.gov) or current REC.

   b. Contactors should be aware that if dead or injured bats are found additional conservation measures to prevent additional injury or mortality throughout the remaining project activities may be required on a project specific basis.

Ner41-107 (09262024)

2.3 Notice to Contractor - Tree Removal.

Tree removal has been completed by others. Notify the engineer of any trees not identified in the plan that require removal. No trees will be removed without the approval of the engineer. Tree removal may occur after October 31 and prior to April 1. Tree removal outside of this time frame is not allowed.

ner41-100 (12052023)

2.4 Notice to Contractor - Subgrade Verification.

Prior to placement of base aggregate materials, verify subgrade for conformance to applicable sections of section 205 of the standard specifications and plan details. Work is included in bid item Common Excavation.

2.5 Work By Others - Outagamie County.

Paving Operations

Outagamie County will perform paving operations related to HMA pavement. The County is anticipating 5 working days to complete the work. Contact Joe Zellmer, Highway Engineer, Outagamie County Highway Department at (920) 209-9807 at least 14 days prior to having the site ready for paving operations.

Outagamie County will perform fine grading prior to paving operations. Provide additional base material and support for fine grading operations, as needed, to Outagamie County if requested.

Facility Locates

Outagamie County has underground utilities serving buildings throughout the Outagamie County Highway Department campus. Outagamie County must be contracted directly to have these facilities marked as they are not marked as part of a Digger's Hotline request. Contact Joeseph Zellmer (920) 209-9807, joseph.zellmer@outagamie.org, a minimum of 7 days in advance of needing facilities marked.

3. Meetings. (Vacant)

4. Traffic and Restrictions to Work.

4.1 Traffic.

General

The construction sequence, including the associated traffic control, shall be substantially accomplished as detailed in the Traffic Control Plans, and described herein.

Maintain emergency vehicle access at all times.

Prior to any traffic control being placed, provide engineer, Wisconsin State Patrol and Outagamie County highway department with the name and telephone number of a local person responsible for the emergency maintenance of traffic control.

Stockpile excess fill material and cleared and grubbed material on upland areas an adequate distance, as approved by the engineer, away from wetlands, storm sewer inlets, floodplains, and the waterways. Provide erosion control devices for stockpiled soil to avoid erosion and nuisance dust emissions.

Construction Access

Coordinate access to Outagamie County Highway Department campus with Outagamie County highway department.

Construction Overview

This information is included to assist the contractor and its subcontractors, do not interpret this information as a demonstration of specified means and methods. Coordinate the schedule of operations as shown in the plans and as noted in these special provisions. Do not move operations ahead unless modifications to the schedule are approved in writing by the engineer.

4.2 Holiday and Special Event Work Restrictions.

Do not perform work on, nor haul materials of any kind along or across any portion of the roadway carrying IH 41 traffic, and entirely clear the traveled way and shoulders of such portions of the highway of equipment, barricades, signs, lights, and any other material that might impede the free flow of traffic during the following holiday and special event periods:

- From noon Thursday, July 3, 2025 to 6:00 AM Monday, July 7, 2025 Fourth of July;
- From noon Friday, August 29, 2025 to 6:00 AM Tuesday, September 2, 2025 Labor Day;
- From noon Friday, May 22, 2026 to 6:00 AM Tueday, May 26, 2026 Memorial Day;
- From noon Friday, July 3, 2026 to 6:00 AM Monday, July 6, 2026 Fourth of July.

stp-107-005 (20210113)

4.3 Traffic Control.

Perform this work in accordance with the requirements of section 643 of the standard spec, and as shown on the plans or as approved by the engineer, except as hereinafter modified.

Submit to engineer for approval a detailed traffic control plan for any changes to the proposed traffic control detail as shown on the plans. Submit this plan ten days prior to the preconstruction conference.

Submit any traffic control change request to the engineer at least 72 hours prior to an actual traffic control change. A request does not constitute approval.

Provide 24 hours-a-day availability of equipment and forces to expeditiously restore lights, signs, or other traffic control devices that are damaged or disturbed. The cost to maintain and restore the above items shall be considered incidental to the item as bid and no additional payment will be made.

Supply the name and telephone number of a local contact person for traffic control repair before starting work.

Have available at all times sufficient experienced personnel to promptly install, remove and reinstall the required traffic control devices to route traffic during the construction operations.

Cover or remove and reinstall existing signs which conflict with traffic control as directed by the engineer.

Conduct operations in such a manner that causes the least interference and inconvenience to the free flow of vehicles on the roadways. This includes the following:

- Do not park or store any vehicle, piece of equipment, or construction materials on the right-of-way without approval of the engineer or as allowed elsewhere in these special provisions.
- All construction vehicles and equipment entering or leaving live traffic lanes shall yield to through traffic.
- Equip all vehicles and equipment entering or leaving the live traffic lanes with a hazard identification beam (flashing yellow signal) capable of being visible on a sunny day when viewed without the sun directly on or behind the device from a distance of 1,000 feet. Activate the beam when merging into or exiting a live traffic lane.

Do not disturb, remove or obliterate any traffic control signs, advisory signs, shoulder delineators or beam guard in place along the traveled roadways without the approval of the engineer. Immediately repair or replace any damage done to the above during the construction operations at contractor expense.

The traffic requirements are subject to change at the direction of the engineer in the event of an emergency.

ner41-643 (12052023)

5. Utilities.

5.1 Utilities.

This contract comes under the provision of Administrative Rule Trans 220.

The utility work plan includes additional detailed information regarding the location of discontinued, relocated, or removed utility facilities. These can be requested from the department during the bid preparation process or from the project engineer after the contract has been awarded and executed.

stp-107-065 (20240703)

The following utility owners have facilities within the project area; however, no conflicts are anticipated.

- **AAMFON (COMLN**
- **ANR Pipeline Co (GSTPR)**
- **AT&T Wisconsin (COMLN)**
- **Kaukauna Utilities (ELCTY)**
- **Little Chute Municipal Water Department (WATER)**
- **TDS Metrocom LLC (COMLN)**
- **We Energies (ELCTY)**
- **We Energies (GSPTR)**

6. Railroad. (Vacant)

7. Environmental.

7.1 Information to Bidders, WPDES Transportation Construction General Permit (TCGP) for Storm Water Discharges.

The calculated land disturbance for the project site is 3.2 acres.

The department has obtained permit coverage through the Wisconsin Department of Natural Resources to discharge storm water associated with land disturbing construction activities under this contract. Conform to all permit requirements for the project.

This permit is the Wisconsin Pollutant Discharge Elimination System, Transportation Construction General Permit, (WPDES Permit No. WI-S066796-2). The permit can be found at:

https://widnr.widen.net/s/s5mwp2gd7s/finalsignedwisdotcsgp

A “Certificate of Permit Coverage” is available from the regional office by contacting Kyle Treml at (920) 492-4167. Post the “Certificate of Permit Coverage” in a conspicuous place at the construction site.

Permit coverage for additional land disturbing construction activities related to contractor means and methods will be considered as part of the ECIP review and approval process. Coverage under the TCGP for additional land disturbance areas will be considered if the areas meet all of the following:

- Must meet the permit's applicability criteria.
- Must be for the exclusive use of a WisDOT project.
- Land disturbance first commences after the ECIP approval, and the areas are fully restored to meet the final stabilization criteria of the permit upon completion of the work.

The contractor is responsible for obtaining any permits for areas that are not approved by the department for coverage under the TCGP.

stp-107-056 (20250108)

8. Clear, Demolition and Removal. (Vacant)

9. Earthwork.

9.1 Preparing the Foundation.

Add the following to standard spec 211.3.1:

Plan construction activities such that the earth subgrade is covered by the roadway base in a timely manner upon completion of preparation of the subgrade or as the engineer directs. The contractor is responsible for the removal of any excess water from the subgrade as a result of rainfall events or natural drainage.

ner-211-005 (20171213)

9.2 Drainage Blanket, Item SPV.0035.01.

A Description

This special provision describes furnishing and placing granular backfill within the limits shown on the plans and as directed by the project engineer.

B Materials

The granular backfill for the drainage blanket shall meet the requirements of standard spec 209.2 for Granular Backfill, Grade 1.

C Construction

Place the granular backfill at the locations designated in the plan documents. Place the granular backfill to a depth of two feet minimum, within the proposed fill limits and leveled. Compact the granular backfill in accordance to standard spec 207.3.6.2. Repair any excessive rutting or deformations in the drainage blanket caused by construction operations as directed by the engineer.

D Measurement

The department will measure Drainage Blanket in cubic yards of volume, acceptably completed, in its final position and condition within the limits and in places designated on the plans, in the contract, or directed by the engineer, and in accordance to standard spec 209.4.

E Payment

The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0035.01	Drainage Blanket	CY

Payment is full compensation for furnishing and placing all materials.

9.3 Settlement Gauges, Item SPV.0060.03.

A Description

A.1 General

This special provision describes furnishing and installation of settlement gauges as well as monitoring of settlement during construction. The purpose of the geotechnical instrumentation is to monitor ground movements after the placement of fill for determining amount of settlement having taken place prior to next phase of building construction and final paving.

Install the settlement gauges and collect the required settlement monitoring data as specified herein. The monitoring program required by this article does not relieve the contractor of responsibility for providing additional gauges or instrumentation and monitoring thereof, if, in the contractor's opinion, such additional gauges or instrumentation and monitoring are necessary to accomplish the work.

Instrumentation installed under this contract shall remain fully operational after all appreciable settlement ceases as determined by the engineer and notification of acceptance by the engineer, prior to building construction and final paving.

This article covers the work necessary to furnish and install geotechnical settlement gauges, maintaining installed gauges, taking initial and subsequent readings, and abandonment of the instruments.

A.2 Submittals

A.2.1 Prior to Installation

Submit the following specific information for information only, at least 30 days prior to the start of settlement gauge installation:

1. Submit qualifications and experience of instrumentation specialists and personnel.
2. Instrumentation shop drawings detailing locations, depths based on general information shown on the plans, type, details, and other pertinent information showing the installation details for each type of instrumentation required.
3. Description of methods for installing and protecting settlement gauges.
4. Schedule of instrument installation related to significant activities or milestones in the overall project.
5. Following installation of the settlement gauges and prior to the start of fill placement, submit as-built shop drawings showing the exact installed location, the instrument identification number, the installation date and time, the plate and extension rod tip elevation and instrument length, and installed locations of control points and benchmarks associated with surveys for monitoring settlement gauges. Include details of installed gauges, accessories, and protective measures including all dimensions and materials used.
6. Manufacturer's literature describing installation, operation, and maintenance procedures for all gauges, materials, readout units, and accessories.
7. Installation logs for gauge installations prepared by the instrumentation specialist.
8. Additional geotechnical instrumentation installed at contractor’s discretion shall be considered incidental to this bid item.

A.2.2 After Installation

Submit the following specific information, for evaluation and acceptance by engineer:

1. All settlement gauge monitoring data.
2. Contractor shall submit documentation of gauge abandonment.

A.3 Locations

Install the settlement gauges prior to the start of fill placement, as determined by the engineer at the following locations:

STA	Offset (ft) / Direction
4+49.27	25.00’ RT
5+62.27	25.00' RT
7+61.54	138.00' RT
7+61.54	25.00' RT

A.4 Quality Assurance

Notify the engineer at least 24 hours prior to all instrumentation installation operations so that the engineer may monitor the installation work. Notify the engineer when initial readings will be made, and the engineer may elect to participate or observe in taking initial readings.

Each settlement gauge shall be the product of an acceptable manufacturer currently engaged in manufacturing and installing settlement gauges as specified herein.

A.4.1 Personnel Qualification

Qualified technicians with a minimum of 2 years of experience in the installations of settlement gauges similar to those specified herein.

A licensed surveyor registered in the State of Wisconsin and have a minimum of 2 years of experience in the installation of geotechnical instrumentation similar to those specified herein.

A.4.2 Control Points

Surveys for monitoring geotechnical gauges shall be referenced to the same control points and benchmarks established for setting out the work. Control points shall be tied to benchmarks and other monuments outside of the zone of ground movements that might result from underground excavations or fill placement.

A.4.3 Tolerances

Settlement gauges shall be installed within 2 feet of the horizontal locations and 1 foot of the vertical locations as indicated in this special provision, accepted shop drawings, or at the direction of the engineer.

Should actual field conditions prohibit installation at the locations and elevations indicated on the plans, prior acceptance shall be obtained from the engineer for new instrument locations and elevations.

Equipment for measuring settlement gauges shall have a horizontal and vertical tolerance of 1/8 inch or less.

A.4.4 Project Conditions

Provide the engineer and the department access to the instruments at all times.

All gauges shall be protected from accidental damage.

A.4.5 Monitoring Settlement Gauges

Monitoring shall be performed by the licensed surveyor and shall consist of taking initial survey (horizontal and vertical) of the settlement plate and subsequent survey of riser cap as fill is placed. Take a minimum of two sets of initial readings. After initial readings are approved by the engineer, the average from the initial readings shall be used to establish the baseline reading.

Monitor settlement gauges as follows:

1. Initial survey reading of plate at 4 corners, top of riser cap, and adjacent ground surface. Subsequent survey of riser cap and adjacent ground surface.
2. Monitor 2 times per week, separated by a minimum of 3 calendar days between readings, during the applicable fill construction stage. Additionally monitor after installing each new riser section.
3. Monitor once per week after completion of fill to final elevation and until termination of monitoring as agreed to with the engineer.

Monitoring shall be summarized in Excel format and access made available to the engineering throughout the monitoring period.

A.4.6 Acceptance

The engineer will evaluate the submittals. Within 7 calendar days after receipt of each submittal, the engineer will notify the contractor of submittal acceptance, or if additional information and/or changes are required. Resubmit the submittal with the required information and/or changes. The engineer will notify the contractor of resubmittal acceptance within 7 calendar days after its receipt.

After the submittal acceptance by the engineer, no changes to the submittal can be made without written consent of the engineer.

B Materials

B.1 Settlement Plates

A 0.5-inch-thick steel plate, 24 inches square in size, placed upon a minimum of 1-inch-thick mortar leveling course, and with a 1 1/2-inch steel riser pipe that is welded in position perpendicular to the plate at its center.

B.2 Risers

Sections of 1 1/2-inch-diameter standard threaded galvanized steel riser pipe welded to the base plate and extended progressively upward at a vertical plumbness as fill is placed and compacted. A 1 1/2-inch standard galvanized steel cap shall be attached to the threaded inner riser plate as a survey reference member, and progressively removed and extended upward as each new section of riser pipe and external sleeve are added due to fill.

B.3 Isolation Casing

Sections of 3-inch-diameter standard threaded steel pipe or threaded PVC pipe sleeve initially placed with a 2-foot separation from the base plate and then extended progressively upward encompassing the 1 1/2-inch steel pipe with the internal annulus filled with grease to promote free sliding between sleeve and internal pipe. This sleeve is intended to be continuous to prevent fill soils from contacting the internal riser pipe over the length of sleeve to the surface as progressive lifts of fill are placed.

C Construction

Install the settlement gauges at locations identified in Section A.3 of this article.

C.1 Installation and Protection

The bottom of the plate shall be placed level on the mortar pad and riser pipe shall be vertical. The elevation of the plate shall be determined, and the lengths and elevations of any added riser pipe(s) shall be accurately measured and recorded.

Position and weld the initial 1 1/2-inch-diameter threaded galvanized steel riser pipe perpendicular to the steel settlement plate with a fillet weld. Place end cap at the top of the riser pipe for purposes as a survey reference point.

Place fill as indicated to the elevations identified and shown in the plans/cross sections.

As soon as fill soils achieve 2 feet of cover over the steel settlement plate, position a 3-inch-diameter sleeve loosely around the smaller diameter riser pipe to isolate and protect the inner pipe for subsequent readings. Fill the inner annulus between steel pipe and outer sleeve with sufficient lubricant grease to prevent rust from occurring and resulting in binding of the inner pipe to the outer sleeve.

Progressively add both inner riser pipe and outer sleeve pipe in section increments of 5.0 feet (or other calibrated and measured increments) as fill is continued to be placed, always transferring the end cap to the newest riser pipe top, and always obtaining new elevation readings at each time of extension addition. When the fill reaches a level approximately 12 inches below the top of the riser, notify the engineer; the engineer may direct that an additional section of riser and cover be installed.

No fill shall be placed around settlement gauges until the elevation of the top of the new riser section has been determined by the contractor’s surveyor.

Fill material in the vicinity of the riser pipe shall be compacted to specification requirements, taking precautions to keep alignment of the riser and the cover pipes vertical at all times.

Take all necessary precautions to ensure that the settlement gauges are not damaged, displaced, or misaligned. If a gauge is damaged, it shall immediately be repaired or replaced by the contractor at

this/her own expense. Contractor to protect and maintain all settlement gauges installed as part of this contract.

All the settlement gauges installed under this contract will be maintained, protected, read, repaired, and replaced (if needed) or as directed by the engineer.

C.2 Abandonment

Abandon settlement gauges after evaluation of settlement data and notification of acceptance by the engineer.

Abandonment shall consist of removal of the top section of riser and isolation casing, and backfilling with granular material as directed by the engineer.

D Measurement

The department will measure Settlement Gauges as each unit, acceptably completed.

E Payment

The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0060.03	Settlement Gauges	EACH

Payment is full compensation for furnishing and placing settlement gauges; extending gauges as fill placement progresses; protecting the gauges; repairing or replacing gauge; and monitoring.

9.4 Vibrating Wire Piezometer Instrumentation System, Item SPV.0060.04.

A Description

This special provision describes furnishing and delivering a vibrating wire piezometer instrumentation system a minimum of 21 days prior to start of placing fill. It also includes providing a technical assistance representative from the company to aid in piezometer installation and to provide on-site technical support. Perform all according to the plans and as provided herein.

B Materials

Materials for the vibrating wire piezometer system shall include one vibrating wire piezometers, one data recorder, and necessary appurtenances.

Vibrating Wire Piezometer: vibrating wire piezometer shall be Geokon Model 4500S, 100 psi range (Geokon Incorporated, 48 Spencer Street, Lebanon, NH 03766, (603) 448-1562) or Slope Indicator Part Number 52611030 (Slope Indicator Company, 316 Forsyth Street, Raleigh, NC 27609-6314, (800) 929-4712), or an approved equal.

Vibrating wire piezometer shall meet the following specifications:

Pressure Range (psi):	0-100
Over Range/Maximum Pressure:	2X rated pressure range
Resolution:	0.025% full scale (F.S.) minimum
Accuracy:	±0.1% of F.S.
Operating Temperature:	-20 °F to 150 °F
Thermal Zero Shift:	<0.05% F.S./°C or <0.04 psi/°C
Cable:	Four conductor, 20 or 22 gauge shielded cable with polyethylene jacket or an approved equal, connection between cable and instrument factory sealed (see table below for required length of cable)
Filter:	50 micron sintered stainless steel
Diameter of piezometer:	a 0.75 inches

Provide a canvas bag, 2½-inch by 18-inch, with each piezometer.

Calibrate piezometer at the factory. Make calibrations while pressure is both increasing and decreasing for at least two cycles, to document hysteresis throughout the maximum range of the instrument. Take readings at a minimum number of eight equal increments and require the manufacturer to supply a calibration curve with data points clearly indicated, and a tabulation of the data. Use the data recorder

that is to be supplied under this item number during the factory calibrations. Make readings at a sufficient number of different temperatures which range from -20 °F to 120 °F to provide a calibration curve, and substantiate it, indicating the effect of temperature change on the instruments. Mark piezometer with a unique identification number.

Signal cables and mechanical waterproof seals between the cable and the piezometer shall be factory installed. No splices are allowed. All cables shall be terminated with connectors compatible with terminal boxes furnished under this item. The required cable lengths shall be determined to extend from the tip of the piezometers to the ground level to the location of the readout box.

Data Recorder: Include with the data recorder a battery charger, adaptors, and cables necessary for field operation, and the computer software required for downloading the data to an IBM compatible personal computer. The software shall also be capable of generating reports and annotated graphs from the data. Acceptable readout and data loggers include Geokon Model GK-403 (Portable Readout Unit and SPLIT Data Formatting Software), Slope Indicator Part Numbers 52620900 AND 52620920 (VS Datamate and Datamate Manager Software), or an approved equal.

The data recorder shall have waterproof seals incorporated into its face place, switches and input connectors. It shall have a backup power source or battery which will keep data secure if the main battery should become discharged. It shall have the capacity of manually recording a minimum of 250 readings, and of automatically recording data at any interval specified and entering a low power mode between the readings taken. It shall have the electronic transfer capability of linking itself and a personal computer for data transfer. Include an interface cable. It shall be able to do the following: display battery charge, display internal temperature and humidity, set date and time, display all data in its memory, and adjust viewing angle of display. It shall have a backlit display. It shall be able to display pore water pressure readings in standard English and metric units of pressure, and temperature readings in degrees Celsius and degrees Fahrenheit.

The data recorder shall also meet the following specifications:

Temperature Range:	Fully operable from -4 ºF to 120 ºF
Excitation Range:	450 - 6000 Hz
Resolution:	0.01% Full Scale
Weight :	˜ 12 lbs.

Furnish the engineer for approval, a minimum of 14 days prior to delivery of the vibrating wire piezometer instrumentation system to the site, the following:

Name and phone number of manufacturer’s designated technical assistance representative,

Manufacturer’s certifications for all components of the system,

Factory calibration certifications for all components of the system,

Factory quality assurance checklist,

Factory preshipment inspection checklist,

Factory warranties for all components of the system,

Shipping documents and shipping schedule,

Unique instrument identification numbers for all components, and

Instruction manuals for each component of the system supplied by the manufacturer.

The location of the readout box.

Include a comprehensive instruction manual with the vibrating wire piezometer instrumentation system. It shall contain the following: (1) *theory of operation*, i.e. the basic measuring principle of the instrument with appropriate illustrations, limitations of the instrument, factors which may affect measurement uncertainty, and a specification sheet; (2) *calibration procedures*, i.e. step-by-step acceptance test procedures to ensure correct functioning when the instrument is first received, procedures for performing calibration checks, and procedures for regular calibration of the readout and data logger;

(3) *installation procedures*, i.e. step-by-step procedure for installation, with illustrations of the system and its components, showing correct juxtaposition when installed, and statement of all factors that should be recorded during installation for later use during data evaluation; (4) *maintenance procedures and trouble-shooting guide* with names, addresses, and telephone numbers of instrument service representatives; (5) *data collection procedures*, i.e. cautions pertaining to personnel and equipment,

procedure for obtaining initial reading, procedure for obtaining readings subsequent to initial readings, listing of equipment and tools required during instrument reading, a field data sheet, and a sample completed field data sheet; and (6) *data processing, presentation, and interpretation procedures*, i.e. data calculation sheet, step-by-step calculation procedure, instruction manual(s) for software supplied by the manufacturer, sample data calculations, alternative methods of plotting the data, sample data plots, and notes on data interpretation.

There shall be a product warranty on all parts of the vibrating wire piezometer instrumentation system of a minimum of one year from the date of delivery to the department against defects in materials and workmanship.

All components of the Vibrating Wire Piezometer Instrumentation System shall be made by the same manufacturer. Each component of the Vibrating Wire Piezometer Instrumentation System shall bear markings to clearly identify it with the manufacturer's certifications previously furnished to the engineer. The term *approved equal* shall be understood to indicate that the *equal* product shall meet all of the specifications, and shall be the same or superior to the products named previously in the specifications in function, performance, accuracy, tolerances, and general configuration. The engineer shall make the final determination if the approved equal is acceptable. Components which do not meet the requirements of the specifications shall be unacceptable and will be rejected by the engineer. The engineer reserves the right to prohibit delivery of any component until certifications provided by the manufacturer, and supplied by the contractor, indicates full compliance with the specifications.

Technical Support: Make available an on-site technical assistance representative from the manufacturer which supplies the Vibrating Wire Piezometer Instrumentation System to instruct the contractor on how to install the first vibrating wire piezometer installed on the project. Also make available on-site the technical assistance representative to assist in the final connections of the vibrating wire piezometer cables to the terminal boxes during construction operations and to assist in initial calibration and reading of the instrumentation.

Notify the Foundation and Pavement Unit of the delivery of the vibrating wire piezometer instrumentation system a minimum of 14 days prior to its arrival. Deliver the Vibrating Wire Piezometer Instrumentation System to the Bureau of Highway Construction, c/o Foundation and Pavement Unit, 3502 Kinsman Boulevard, Madison, WI 53704. Upon delivery, the data recorder with its appurtenances becomes the property of the department. Upon completion of the project, ownership of the data recorder with its appurtenances becomes the property of the Foundation and Pavement Unit Section.

C (Vacant)

D Measurement

The department will measure Vibrating Wire Piezometer Instrumentation System as each individual unit, acceptably completed.

E Payment

The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0060.04	Vibrating Wire Piezometer Instrumentation System	EACH

Payment is full compensation for furnishing and delivering all components of the Vibrating Wire Piezometer Instrumentation System for the project, and for providing technical support at the project site.

9.5 Prefabricated Vertical Drains, Item SPV.0090.02; Prebored Prefabricated Vertical Drains, SPV.0090.03.

A Description

This special provision describes furnishing and installing prefabricated vertical drains (PVD) or "wick drains" after topsoil has been removed and ground has been graded for positive drainage. Perform all work according to the plans and as provided herein.

B Materials

The prefabricated vertical drains shall consist of a corrugated plastic or polyethylene core wrapped on all sides with a non-woven, filter geotextile fabric. The geotextile wrap shall be tight around the core and shall be securely seamed in a manner that will not introduce any new materials nor present an obstruction that will impede the flow in the channels of the core. The prefabricated vertical drains shall be Alidrain,

Amer-Drain Type 407, Mebra-Drain or an approved equal. The core shall be fabricated with suitable drainage channels.

Every component of the prefabricated vertical drains shall be insect, rodent, mildew, and rot resistant.

The drains shall be free of defects, rips, holes, or flaws. Furnish the prefabricated vertical drains in a wrapping which will protect them from abrasion due to shipping and hauling. The engineer may reject material that is damaged during shipment, storage or handling; or which does not meet the minimum requirements of the wick drain material. The prefabricated vertical drains are to be kept dry until installed. During storage on site, the storage area shall be such that the drain is protected from sunlight, mud, dirt, debris, and detrimental substances.

Clearly mark the prefabricated vertical drain rolls showing the type of vertical drain.

Furnish the engineer for approval manufacturer's certifications and prefabricated vertical drain samples a minimum of 14 days prior to delivery of the prefabricated vertical drains to the site. Only one type of prefabricated vertical drain, i.e. prefabricated vertical drain made by the same manufacturer and of the same dimensions and in-plane flow rate, is to be used for the entire project. The delivered prefabricated vertical drains shall bear markings to clearly identify it with the manufacturer's certifications previously furnished to the engineer.

C Construction

Install prefabricated vertical drains with approved equipment of a type which will cause a minimum disturbance of the subsoil during the installation operation. Install the prefabricated vertical drain using a mandrel or sleeve which completely encloses the prefabricated vertical drain, thereby protecting it from tears, cuts, and abrasions during installation. The mandrel or sleeve shall be of minimal cross-sectional area.

Identify the location of all planned monitoring devices relative to wick drain positions and other planned construction activities so that instrumentation shall be installed within the middle of the triangular spacing of a wick drain pattern in order to avoid all potential conflicts.

Submit details of the sequence and method of prefabricated vertical drain installation to the engineer by the contractor a minimum of 14 days prior to the installation of the vertical drains for the engineer's approval. Approval by the engineer will not relieve the contractor of his responsibility to install the prefabricated vertical drains in accordance to these specifications.

Prior to the installation of prefabricated vertical drains within the designated areas, demonstrate that his equipment, installation method, and materials produce a satisfactory installation in accordance to these specifications. For this purpose the contractor shall be required to install trial prefabricated vertical drains at locations designated by the engineer. Payment will be at the unit price per linear foot for the prefabricated vertical drains. Payments will not be made for installing unsatisfactory trial prefabricated vertical drains.

Approval by the engineer of the method and equipment used to install the trial drains shall not constitute acceptance of the method for the remainder of the project. If at any time the engineer considers that the method of installation does not produce a satisfactory drain, the contractor shall alter his method or equipment as necessary to comply with these specifications.

Prefabricated and prebored prefabricated vertical drains shall be located, numbered, and staked out by the contractor. Do not vary the locations of drains by more than 6 inches from the locations indicated in the plan documents or as directed by the project engineer.

Force vertically the mandrel with the prefabricated vertical drain inside into the ground to the elevation shown on the contract documents or to bedrock, whichever is higher. Retract the mandrel leaving the prefabricated vertical drain in place to function as a vertical drain. Cut the prefabricated vertical drain neatly at its upper end with a 12 inch length of drain material extending above the drainage blanket.

Re-level the surface of the granular sub-base course disturbed by prefabricated vertical drain installation equipment. Re-grading will not be allowed. Repair any excessive rutting or deformations in the drainage blanket as directed by the project engineer at no additional cost to the department.

Splices or connections in the prefabricated vertical drain material will not be allowed.

Carefully check the equipment for plumbness prior to advancing each prefabricated vertical drain and must not deviate more than 1 (one) inch per foot from the vertical.

When obstructions are encountered below the working surface which in the opinion of the engineer cannot be penetrated using normal and accepted procedures, complete the drain from the elevation of

the obstruction to the working surface. At the direction of the engineer, install a new drain within 18 inches from the obstructed drain. Pay contractor for all obstructed drains at the contract unit price unless the drain is improperly installed.

Observe precautions necessary for protection of instrumentation devices. After instrumentation devices have been installed, replace at his cost any equipment that is damaged or become unreliable due to his construction operations.

Prefabricated vertical drains that are out of their proper location by more than 6 inches, prefabricated vertical drains that are damaged during construction or prefabricated vertical drains that are improperly installed shall be rejected by the engineer and no compensation will be allowed for any materials furnished or for any work performed on such drains.

Supply the engineer with a suitable means of making a linear determination of the quantity of prefabricated vertical drain material used at each prefabricated vertical drain location. During installation of the prefabricated vertical drain, provide suitable means of determining the depth of the prefabricated vertical drain.

D Measurement

The department will measure Prefabricated Vertical Drains and Prebored Prefabricated Vertical Drains by the linear foot for the full length of prefabricated vertical drain installed, acceptably completed. The contractor will not be paid for any more than an 18 inch length of prefabricated vertical drain extending above the drainage blanket.

E Payment

The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0090.02	Prefabricated Vertical Drains	LF
SPV.0090.03	Prebored Prefabricated Vertical Drains	LF

Payment for Prefabricated Vertical Drains is full compensation for the cost of furnishing the prefabricated vertical drain material, installation, altering of the equipment and methods of installation in order to produce the required end result in accordance to the plans and specifications. No payment will be made for unacceptable prefabricated vertical drains or for any delays or expense incurred through changes necessitated by improper or unacceptable material or equipment.

Payment for Prebored Prefabricated Vertical Drains is full compensation for the cost of furnishing the prefabricated vertical drain material, pre-drilling, installation, altering of the equipment and methods of installation in order to produce the required end result in accordance to the plans and specifications.

10. Bases, Subbases and Pavements.

10.1 Asphaltic Surface, Item 465.0105.

Replace standard spec 465.2(1) with the following:

Under the Asphaltic Surface bid item; submit a mixture design. Furnish asphaltic mixture meeting the requirements specified for a 3 MT or 4 MT mix under 460.2; except the engineer will not require the contractor to conform to the quality management program specified under 460.2.8. Use tack coat as required under 450.3.2.7.

11. Bridges. (Vacant)

12. Retaining Walls, Ground Support. (Vacant)

13. Drainage and Erosion Control.

13.1 Temporary Ditch Checks

Complete work in accordance to section 628 of the standards spec and as herein provided. Erosion bales will not be allowed for construction of temporary ditch checks.

Delete subsection 628.3.14(2) of the standard specifications and replace it with the following:

(2) Construct temporary ditch checks per guidance provided in the Wisconsin Erosion Control Product Acceptability List (PAL). Place temporary ditch checks across ditches at locations the plans show or as the engineer directs immediately after shaping the ditches or slopes. Excavate upstream sumps as the engineer directs.

Delete subsection 628.4.17 of the standard specifications and replace it with the following:

(1) The department will measure Temporary Ditch Checks by the linear foot acceptably completed.

14. Miscellaneous Concrete. (Vacant)

15. Signing and Marking. (Vacant)

16. Lighting - Electrical. (Vacant)

17. Intelligent Transportation Systems (ITS). (Vacant)

18. Miscellaneous and Incidental Construction.

18.1 Construction Staking Survey Project 1130-65-88, Item SPV.0060.01.

A Description

This special provision describes providing all construction staking survey required to layout and construct the work. Conform to standard spec 650 and standard spec 105.6, and as follows.

B (Vacant)

C Construction

Perform all surveying required to construct the work under this contract as specified in standard spec 650. Include all other miscellaneous survey required to layout and construct all work under this contract.

Remove and replace standard spec 105.6 with the following:

105.6 Construction Staking

105.6.1 General

(1) The department is responsible for errors or discrepancies found in previous department surveys, plans, specifications, special provisions, or work constructed under other department contracts. The department will pay for further studies and redesign required due to these errors or discrepancies.

(2) The department will furnish data for the horizontal and vertical control points. Prosecute the work using these points for field control. The department is responsible for the accuracy of lines, slopes, and grades it provides. The engineer and contractor shall agree on the meaning of all stakes, measurements, and marks before the contractor begins work.

105.6.2 Contractor-Performed Staking

Provide the construction stakes or markings needed to prosecute the work as follows:

(1) Additional staking or markings that might be needed to support the contractor's specific method of operations.

(2) Staking required under standard spec 650 to lay out and construct the work for the individual construction bid items the contract includes.
(3) Other staking or markings as required to successfully prosecute the work.

The contractor is responsible for the accuracy of lines, slopes, and grades the contractor provides. Construct the work conforming to the lines, grades, cross sections, and dimensions the contract specifies or the engineer establishes.

Notify the engineer immediately when finding errors or discrepancies in previous surveys, plans, specifications, special provisions, or work constructed under other contracts. Suspend related operations until the engineer gives approval to proceed.

The engineer may check the control of work, as established by the contractor, at any time. The engineer will provide the results of these checks to the contractor, but by doing so in no way relieves the contractor of the responsibility for the accuracy of their layout work.

Correct or replace deficient layout and construction work resulting from:

(1) Inaccuracies in the contractor's staking operations.
(2) Not reporting inaccuracies found in work done by the department or by others.

If, due to the inaccuracies in 105.6.2(5), the department is required to make further studies, redesign, or both, the department will deduct all expenses incurred from the payment due the contractor.

D Measurement

The department will measure Construction Staking Survey Project as a single unit acceptably completed for the entire project.

E Payment

The department will pay for the measured quantity at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0060.01	Construction Staking Survey Project 1130-65-88	EACH

Payment is full compensation for performing all survey work required to layout and construct all work under this contract.

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18.2 Precast Concrete Salt Storage Building, Item SPV.0060.02.

A Description

The work under this item consists of furnishing and installing a complete salt storage building structure and all associated items described herein. All items needed to construct the salt storage building shall be included in the Precast Concrete Salt Storage Building bid item, unless otherwise noted herein. Complete this work according to the plans, this special provision with technical specifications, and the applicable sections of the standard specification. If there is a conflict in the requirements of this special provision with technical specifications and the standard specification, the more stringent standard shall apply.

B Materials

All materials shall meet the standard specifications and technical specifications included in this special provision.

It is the responsibility of the contractor to submit shop drawings for review and acceptance by the department for items detailed in this special provision. Submit shop drawings to the department conforming to the procedures outlined in Standard Specification Section 105 Control of Work. Department review does not relieve the contractor from responsibility for errors or omissions on the shop drawings.

C Construction

All construction shall meet the standard specifications and technical specifications included in this special provision.

D Measurement

The department will measure Precast Concrete Salt Storage Building as a single unit of work, completed and accepted in accordance with the contract.

E Payment

The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0060.01	Precast Concrete Salt Storage Building	EACH

Payment is full compensation for designing the building; for providing, constructing, and erecting the foundations, walls, roof, and all other accessory items specified herein, including but not limited to, pipe bollards, concrete stoops and aprons, doors, lighting, electrical and other accessories; for construction staking of the structure; for obtaining necessary permits; for performing all required testing; for providing electrical service; and for furnishing manufacturer's warranties.

Site work including clearing, excavation, backfill, asphaltic pavement and base course (including asphalt pavement inside the building), and other site related items will be paid for separately.

INDEX OF TECHNICAL SPECIFICATIONS

Technical specifications that apply to this special provision include:

DIVISION 03–CONCRETE

Section 03 11 00 Concrete Formwork

Section 03 20 00 Concrete Reinforcement

Section 03 30 00 Cast-In-Place Concrete

Section 03 41 10 Precast Double Tees

Section 03 45 00 Precast Wall Panels

DIVISION 05–METALS

Section 05 50 00 Metal Fabrications

Section 05 56 00 Anchor Bolts and Post-Installed Anchors

DIVISION 07–THERMAL AND MOISTURE PROTECTION

Section 07 53 00 Single-Ply Roofing Fully Adhered

Section 07 71 00 Manufactured Roof Specialties

Section 07 71 23 Downspouts

Section 07 90 00 Caulking and Sealants

DIVISION 08–DOORS AND WINDOWS

Section 08 22 10 Fiberglass Doors and Frames

Section 08 33 23 Overhead Coiling Doors

Section 08 71 00 Door Hardware

DIVISION 09–FINISHES

Section 09 91 00 Painting

DIVISION 10–SPECIALTIES

Section 10 44 43 Fire Extinguishers and Accessories

DIVISION 26–ELECTRICAL

Section 26 05 00 General Electrical Requirements

Section 26 05 19 Wire

Section 26 05 26 Secondary Grounding

Section 26 05 29 Supporting Devices

Section 26 05 33 Conduit

Section 26 05 35 Boxes

Section 26 05 44 Underground Pull Boxes

Section 26 05 53 Electrical Identification

Section 26 21 00 Electrical Service System

Section 26 24 16 Panelboards

Section 26 27 26 Wiring Devices

Section 26 28 16 Disconnect Switches

Section 26 43 13 Surge Protective Devices (SPD)

Section 26 51 13 Lighting

DIVISION 27– COMMUNICATION

Section 27 10 00 Structured Cabling

DIVISION 28–ELECTRONIC SAFETY AND SECURITY

Section 28 10 00 Access Control System

SECTION 03 11 00
CONCRETE FORMWORK

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Forms for cast-in-place concrete.
   2. Form accessories.
   3. Openings for other work.
   4. Form stripping.

1.02 REFERENCES

A. ACI 117–Tolerances for Concrete Construction.

B. ACI 301–Structural Concrete for Buildings.

C. ACI 318–Building Code Requirements for Reinforced Concrete.

D. ACI 347–Recommended Practice for Concrete Formwork.

E. PS1–Construction and Industrial Plywood.

F. Standard Specifications: Unless otherwise indicated, Standard Specifications within this section shall refer to the State of Wisconsin Standard Specifications for Highway and Structure Construction, Current Edition.

1.03 DESIGN

A. All formwork shall comply with ACI 347 and ACI 301.

B. Contractor shall assume the responsibility for the complete design and construction of the formwork.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Standard Specification Section 105 for form ties, form coatings, form liners (if any), and any other form accessories.

PART 2–PRODUCTS

2.01 FORMS

A. Forms shall be of wood, plywood, steel, fiberboard lined, or other approved materials which will produce concrete which meets the specified requirements. The type, size, quality, and shape of all materials of which the forms are made are subject to the review of engineer.

B. Caution shall be exercised in the use of wood or composition forms or form liner to be certain that no chemical reaction will take place which causes a damaging effect on the concrete surface.

2.02 FORM TIES–NONREMOVABLE

A. Internal wall ties shall contain positive stops at the required wall thickness. The exterior clamp portions of the tie shall be adjustable in length. Ties shall have cones where concrete is to remain exposed. Ties shall provide a positive disconnection on both ends 1 to 1 1/2 inches inside the finished face of the concrete.

B. The use of wood spacers and wire ties will not be approved.

2.03 FORM COATINGS

A. Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces requiring bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

2.04 CHAMFER STRIPS

A. Provide 3/4-inch by 3/4-inch wood or plastic chamfer strips at all exposed corners, except as noted.

2.05 KEYWAYS

A. Keyways shall be formed with wood inserts.

PART 3–EXECUTION

3.01 CONSTRUCTION

A. Forms shall conform to the shape, line, grade, and dimensions as shown on the drawings. They shall be mortar-tight and sufficiently rigid to prevent displacement or sagging between supports and shall support the loads and pressures without deflection from the prescribed lines. They shall be properly braced or tied together so as to maintain position and shape. Spacing of ties shall be recommended by the tie manufacturer.

B. Formwork and finished concrete construction shall meet the tolerances specified in ACI 117.

C. Architectural surfaces and surfaces to be fitted with equipment shall be formed to match the shape intended. Where indicated on the drawings, the form shall be lined with minimum 3/8-inch masonite and shimmed as required.

D. When forms are placed for successive concrete placement, thoroughly clean concrete surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

E. Provide inserts and provide openings in concrete form work to accommodate work of other trades. Verify size and location of openings, recesses, and chases with the trade requiring such items. Securely support items to be built into forms.

F. Bevel wood inserts for forming keyways (except in expansion joints where inserts shall have square edges), reglets, recesses, and the like to assure ease of removal. Inserts shall be securely held in place prior to concrete placement. Unless otherwise shown, chamfer strips shall be placed in the angles of the forms to provide 3/4-inch bevels at exterior edges and corners of all exposed concrete.

G. The forms shall be oiled with a field-applied commercial form oil or a factory-applied nonabsorptive liner. Oil shall not stain or impede the wetting of surfaces to be cured with water or curing compounds. The forms shall be coated prior to placing reinforcing steel. Oil on reinforcement will not be permitted.

H. All form surfaces shall be thoroughly cleaned, patched, and repaired before reusing and are subject to review of engineer.

3.02 FORM REMOVAL

A. Supporting forms and shoring shall not be removed until the member has acquired sufficient strength to support its own weight and the construction live loads on it.

B. All form removal shall be accomplished in such a manner that will prevent injury to the concrete.

C. Forms shall not be removed before the expiration of the minimum times as stated below or until the concrete has attained its minimum 28-day design strength as confirmed by concrete cylinder tests, unless specifically authorized by engineer. Wall and vertical faces: 24 hours.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCEMENT

PART 1–GENERAL

1.01 SUMMARY

A. Work includes providing complete, in-place, all steel and fibers required for reinforcement of cast-in-place concrete as shown on the drawings.

1.02 REFERENCES

A. Applicable standards listed in this section include, but are not necessarily limited to the following:
   1. ACI 315–Manual of Standard Practice for Detailing Reinforced Concrete Structures.
   2. ACI 318–Building Code Requirements for Reinforced Concrete.
   3. ASTM A1064–Standard Specifications for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
   4. ASTM A615–Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   5. ASTM A996–Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcing.
   6. ASTM C1116-Standard Specification for Fiber-Reinforced Concrete.
   7. CRSI–Manual of Standard Practice.

B. Standard Specifications: Unless otherwise indicated, Standard Specifications within this section shall refer to the State of Wisconsin Standard Specifications for Highway and Structure Construction, Current Edition.

1.03 PRODUCT HANDLING

A. Delivery:
   1. Deliver reinforcement to the job site bundled, tagged, and marked.
   2. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

B. Storage: Store reinforcement at the job site on blocks and in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2–PRODUCTS

2.01 MATERIALS

A. Provide high-strength bar steel reinforcement in accordance with Section 505 of the Standard Specifications.

B. Reinforcement supports including bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place shall be:
   1. Wire bar-type supports complying with CRSI recommendations, unless otherwise indicated.
   2. For slabs on grade, supports with sand plates, or horizontal runners where base material will not support chair legs.
   3. For exposed-to-view concrete surfaces or where the concrete surface will be exposed to weather or moisture, where legs of supports are in contact with forms, supports with either hot-dipped galvanized or plastic protected legs.

4. When supports bear directly on the ground and it is not practical to use steel bar supports, precast concrete blocks may be used to support only the bottom lift of reinforcement. The precast blocks must be solid, be of an equal or higher strength than the concrete being placed, must provide adequate support to the reinforcement, and be of proper height to provide specified reinforcing cover. The use of face bricks, hollow concrete blocks, rocks, wood blocks, or other unapproved objects will not be permitted.

2.02 FABRICATION

A. General:
1. Fabricate reinforcing bars to conform to required shapes and dimensions with fabrication tolerances which comply with CRSI Manual.
2. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
3. Unless otherwise shown on the drawings, all end hook dimensions shall conform with “ACI Standard Hooks.”

B. Reinforcement with any of the following defects shall be deemed unacceptable and will not be permitted in the work:
1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
2. Bend or kinks not indicated on drawings or final shop drawings.
3. Bar with reduced cross section because of excessive rusting or other cause.

PART 3–EXECUTION

3.01 INSPECTION

A. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed.

B. Correct conditions detrimental to the proper and timely completion of the work.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. General:
1. Comply with the specified standards for details and methods of placing reinforcement and supports.
2. Clean reinforcement to remove loose rust, mill scale, earth, and other materials which reduce or destroy bond with concrete.

B. Placing Reinforcement:
1. All reinforcing shall be placed in accordance with Contract drawings and with shop drawings stamped and approved by engineer.
2. Position, support, and secure reinforcing against displacement by formwork, construction, or concrete placement operations.
3. Support reinforcing by metal chairs, runners, bolsters, spacers, and hangers as needed.
4. Unless otherwise shown on the drawings, the reinforcement is to be so detailed and placed as to allow the following concrete protection:
   a. Three inches of cover where the concrete is placed directly against ground.
   b. Two inches of cover where the concrete is placed in forms but is to be exposed to weather, liquid, or the ground.
5. Reinforcement shall be positioned within ±3/8-inch for members with depth to tension reinforcing from compression face less than or equal to 8 inches. Tolerance shall be ±1/2 inch for members with depth to tension reinforcing from compression face greater than 8 inches. Tolerance on dimension between adjacent bars in slab and wall reinforcing mats shall be 1 inch. Secure against displacement by anchoring at the supports and bar intersections with wire or clips.
6. Bars shall be securely tied at all intersections except where spacing is less than 1 foot in each direction when alternate intersections shall be tied. To

avoid interference with embedded items, bar spacing may be varied slightly if acceptable to engineer. Tack welding of reinforcing will not be permitted.

7. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
8. If reinforcing must be cut because of openings or embedded items in the concrete, additional reinforcing must be provided adjacent to the opening at least equal in cross sectional area to that reinforcing which was cut, and it shall extend a minimum of 36 bars diameters beyond the opening on each side or as shown on the drawings. At sumps or depressions in slabs, bars shall be bent and/or extended under sumps or depressions.

C. Reinforcement Supports:
   1. Strength and number of supports shall be sufficient to carry reinforcement.
   2. Do not place reinforcing bars more than 2 inches 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.

D. Welded Wire Fabric:
   1. Install welded wire fabric in as long of lengths as practicable.
   2. Lap adjoining pieces at least one full mesh.
   3. Fabric shall be supported with bar supports.

E. Splices:
   1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tightly wire tying.
   2. Lap splices in reinforcing shall be provided as shown on the drawings. Where lap splice lengths are not shown on the drawings, provide Class B, Category 1 lap splices in accordance with ACI 318.

F. Embedded Items:
   1. Allow other trades to install embedded items as necessary.
   2. Particularly after bottom layer of reinforcing is placed in slabs, allow electrical contractors to install conduit scheduled for encasement in slabs prior to placing upper layer of reinforcing.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. All cast-in-place concrete as shown except as noted otherwise.
   2. Expansion joint fillers, curing compounds, nonshrink grout, and other related items and accessories.

1.02 REFERENCES

A. Standard Specifications: Unless otherwise indicated, Standard Specifications within this section shall refer to the State of Wisconsin Standard Specifications for Highway and Structure Construction, Current Edition.

B. ACI 211.1–Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

C. ACI 301–Specifications for Structural Concrete.

D. ACI 304R–Guide for Measuring, Mixing, Transporting, and Placing Concrete.

E. ACI 305R–Guide to Hot Weather Concreting.

F. ACI 306R–Guide to Cold Weather Concreting.

G. ACI 308–Specification for Curing Concrete.

H. ACI 309–Guide for Consolidation of Concrete.

I. ACI 318–Building Code Requirements for Structural Concrete and Commentary.

J. ASTM C31–Standard Practice for Making and Curing Concrete Test Specimens in the Field.

K. ASTM C33–Standard Specification for Concrete Aggregates.

L. ASTM C39–Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

M. ASTM C40–Standard Test Method for Organic Impurities in Fine Aggregates for Concrete.

N. ASTM C88-Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

O. ASTM C94–Standard Specification for Ready-Mixed Concrete.

P. ASTM C143–Standard Test Method for Slump of Hydraulic-Cement Concrete.

Q. ASTM C150–Standard Specification for Portland Cement.

R. ASTM C156–Standard Test Method for Water Loss (from a Mortar Specimen) Through Liquid Membrane-Forming Curing Compounds for Concrete.

S. ASTM C172–Standard Practice for Sampling Freshly Mixed Concrete.

T. ASTM C231–Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.

U. ASTM C260–Standard Specification for Air-Entraining Admixtures for Concrete.

V. ASTM C309–Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

W. ASTM C494–Standard Specification for Chemical Admixtures for Concrete.

X. ASTM C595–Standard Specification for Blended Hydraulic Cements.

Y. ASTM C618–Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

Z. ASTM C652–Standard Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale).

AA. ASTM D994–Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).

BB. ASTM D1752–Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Standard Specification Section 105.

B. Submit concrete mix information required by Standard Specification Sections 501, 502, and 715.

1.04 PAYMENT

A. The department will not pay for incentive for concrete strength as listed in Standard Specification Section 715.

B. Submit concrete mix information required by Standard Specification Sections 501, 502, and 715.

PART 2–PRODUCTS

2.03 CONCRETE MIX

A. Provide Grade A, Class I concrete conforming to Standard Specification Section 501. Concrete shall reach a minimum 28-day compressive strength of 4,000 psi.

2.04 JOINT FILLER

A. Provide preformed joint filler in accordance with Section 502.2.7 of the Standard Specifications.

2.05 NONSHRINK GROUT

A. Grout shall be nonshrink, nonmetallic and shall achieve a strength of 7,500 psi in 28 days.

PART 3–EXECUTION

3.01 MIXING

A. Ready-mixed concrete shall be batched, mixed, and delivered in accordance with Standard Specifications Sections 501 and 502.

3.02 JOINTS

A. Contractor shall place all joints as shown on the drawings or specified herein. If approved by engineer, contractor may, at his own expense, place construction joints in addition to and at places other than those shown on the drawings. Unless otherwise shown, all joints shall be straight, truly vertical or horizontal, and proper methods shall be employed to obtain this result.

B. Where joints are not shown on the drawings or specified elsewhere, contractor shall provide joints as follows:
   1. Walls shall have vertical joints at 60 feet on center maximum but not more than 15 feet from corners or intersections and shall have horizontal joints at 15 feet on center maximum.
   2. Slabs shall have joints at 20 feet on center maximum in each direction.

3.03 EMBEDDED ITEMS IN CONCRETE

A. All sleeves, inserts, anchors, and embedded items required for adjoining work or for its support shall be placed prior to concreting.

B. All contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to introduce and/or furnish embedded items before the concrete is placed.

C. Embedded items shall be positioned accurately and supported against displacement. Reinforcing bars shall clear embedded items a minimum of 2 inches.

3.04 PLACING CONCRETE

A. Place concrete in accordance with Section 502.3.5 of the Standard Specifications.

3.05 CURING

A. Cure concrete in accordance with Section 502.3.8 of the Standard Specifications.

3.06 HOT WEATHER CONCRETING

A. When the atmospheric temperature exceeds 80°F during concrete placement, follow hot weather concreting requirements in Section 501.3.8.2 of the Standard Specifications.

3.07 COLD WEATHER CONCRETING

A. Conditions of this section shall apply, in addition to all other sections of the specifications, when placing concrete in cold weather. Cold weather is defined as air temperature below 40°F.

B. Provide cold weather protection in accordance with Section 502.3.9 of the Standard Specifications.

3.08 FINISHING

A. Flat Work:
   1. Tolerance for concrete floors shall be 1/4 inch within 10 feet in any direction. Straight edge shall be furnished by contractor.

2. Broom or Belt Finish: Immediately after concrete has received a floated finish, give the concrete surface a coarse transverse scored texture by drawing a broom or burlap belt across the surface.
3. The above finishes shall be used in the following locations: Broom or Belt Finish: Exterior slabs and sidewalks.

B. Formed Surfaces: Provide finish in accordance with Section 502.3.7 of the Standard Specifications.

3.09 LOADING OF CONCRETE STRUCTURES

A. No concrete structure or portion thereof shall be loaded with its design load until the concrete has obtained its specified 28-day compressive strength. This shall include but not be limited to vertical live load, equipment loading, water loading, groundwater loading, and backfill load. Concrete strength at time of loading shall be determined by testing field-cured concrete cylinders.

B. Extreme care shall be taken to ensure that construction loads do not exceed design loading of the structure.

3.10 NONSHRINK GROUT

A. Nonshrink, nonmetallic grout shall be used for filling recesses and pockets left for equipment installation and for setting of base plates. The material used shall be approved by engineer. Store, mix, and place the nonshrinking compound as recommended by the manufacturer. The minimum compressive strength shall be 5,000 psi at age 7 days and 7,500 psi at age 28 days.

3.11 TESTING AND SAMPLING

A. Test concrete in accordance with Section 715 QMP Concrete Pavement, Cast-in-Place Barrier and Structures of the Standard Specifications.

END OF SECTION

SECTION 03 41 10
PRECAST DOUBLE TEES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Precast concrete roof tees.
   2. Accessories

B. Related Sections and Divisions:
   1. Section 03 30 00–Cast-in-Place Concrete.
   2. Section 05 50 00–Metal Fabrications.
   3. Section 07 90 00–Caulking and Sealants.

1.02 REFERENCES

A. ACI–American Concrete Institute.

B. ACI 318–Building Code Requirements for Structural Concrete.

C. AWS–American Welding Society.

D. ICC (IBC)–2015 International Building Code.

E. PCI–Precast/Prestressed Concrete Institute.

F. PCI MNL-116–Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

G. PCI MNL-120–PCI Design Handbook - Precast and Prestressed Concrete.

H. PCI MNL-135–Tolerance Manual for Precast and Prestressed Concrete Construction.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Standard Specification Section 105.

B. Submit concrete mix information required by Standard Specification Sections 501 and 502.

C. All precast components designs shall bear the name and seal of a State of Wisconsin licensed professional engineer. Contractor shall be responsible for submitting the required additional copies of precast components drawings with original stamp and signature for submittal to the State of Wisconsin. These materials must be submitted prior to installation.

D. Shop Drawings: Include layout plans with unit locations, bearing and top of unit elevations, overall dimensions, building cross sections, wall sections, details, and opening locations.
   1. Separately elevate and dimension each type of unit. Indicate location of each unit on overall layout by using the same identification mark placed on the actual unit.
   2. Indicate welded connections by AWS standard symbols and show size, length, and type of each weld.
   3. Indicate locations of and detail hardware and anchorage devices to be cast-in to precast units with relationship to structure.

4. Indicate locations of and detail hardware and anchorage devices to be embedded into or attached to structure or other construction with relationship to structure.
5. Schedule loose hardware and anchorage devices to be installed by others. Include in schedule the identification marks, item descriptions, and total quantities.
6. Indicate locations of and detail lifting and handling devices.
7. Indicate sections and details showing quantities and position of reinforcing steel and related items including special reinforcement.
8. Indicate shim sizes and grouting sequence.
9. Handling procedures, sequence of erection, and bracing plan.

E. Product Data: Indicate standard component configuration, design loads, deflections, cambers, and bearing requirements. Include all dead, live and other applicable loads used in design on the shop drawings.

F. Samples: Provide department with samples representing the finish color and texture of exposed surfaces when requested. Samples to be a minimum of 12 by 12 inches.

G. Submit test reports for concrete and other structural materials tested during fabrication including cement mill reports, mix reports, and cylinder break reports.

1.04 COORDINATION AND SEQUENCING

A. Coordinate opening sizes and locations, attachment of related items, and other work related to the fabrication and installation of precast concrete units.

B. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

1.05 PREINSTALLATION CONFERENCE

A. Convene a minimum two weeks prior to commencing work of this section and review the following items:
1. Approved shop drawings and installation details.
2. Anchor and weld plate locations.
3. Opening locations including those cut in the field.
4. Limitations of field cutting and core drilling.
5. Site access requirements and obstructions.
6. Cold weather grouting requirements.
7. Cleaning responsibilities and expectations.

1.06 PERFORMANCE REQUIREMENTS

A. Provide precast concrete units and connections capable of withstanding the design loads as shown on the drawings.

B. Design members exposed to weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

C. Design system to accommodate construction tolerances, deflection of other building structural members, and clearances of intended openings.

D. Tees shall be capable of resisting shear forces as a diaphragm. Diaphragm chords will be the elements designated by the professional engineer completing the design.

1.07 QUALITY ASSURANCE

A. Single Source Requirement: Provide precast concrete of this section and Section 03 45 00–Precast Wall Panels by one manufacturer.

B. Design members exposed to weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

C. Fabricator Qualifications: A firm that specializes in manufacturing the types of precast concrete specified in good standing in the PCI Plant Certification Program, and that complies with the following requirements:
   1. Assumes responsibility for engineering precast concrete units to comply with the performance requirements. The responsibility includes preparation of Shop Drawings and design performed by a qualified Professional Engineer.
   2. Participates in PCI's Plant Certification Program at the time of bidding and through the construction process.
   3. Has sufficient production capacity to produce the required units without delaying the work.

D. Erector Qualifications: PCI Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years' experience in the erection of precast concrete similar to the requirements of this project.

E. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, "PCI Design Handbook–Precast and Prestressed Concrete," applicable to types of structural precast concrete units indicated.

F. Quality-Control Standard: For manufacturing procedures and testing requirements and quality control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Concrete Products." Comply with the camber and dimensional tolerances of PCI MNL 135, "Tolerance Manual for Precast and Prestressed Concrete Construction."

G. Welder Qualifications: AWS Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years' experience in the erection of precast concrete similar to the requirements of this project.

1.08 DELIVERY, STORAGE, AND HANDLING

A. General Requirement: All lifting and handling, transportation and delivery, storage and support, and erection of precast panels to be performed by qualified personnel using methods and equipment approved by the manufacturer.

B. Identification: Label each unit with date of production and mark indicating unit location on the shop drawings.

C. Lifting and Handling: Lift and handle units at all times by lifting points indicated on the shop drawings. Lift with manufacturer approved lifting devices.

D. Transportation and Delivery: Transport units in accordance with manufacturer requirements.

E. Storage and Support: Store and support units off the ground with identification marks clearly visible and so lifting devices are accessible and undamaged. Separate stacked units by batten across full width of each bearing point. Protect members to prevent staining, chipping, or spalling of concrete.

1.09 WARRANTY

A. Provide twelve-month warranty for workmanship, materials, and satisfactory performance.

PART 2–PRODUCTS

2.01 PRECAST UNITS

A. Roof Double Tees:
   1. Size/Shape/Profile: As indicated on the drawings or needed by design.
   2. Screed Side: As indicated under “Screed Side Finishes.”
   3. Form Sides: Grade B (PCI), refer to description below.
   4. Bottom Side Coating: Sealer as specified.
   5. Ends: Recess strands and coat with zinc-rich coating.
   6. Concrete Color: Gray.

B. Form Side Finishes (PCI): Grade B: All air holes over 1/4-inch in size should be filled. Air holes between 1/8 and 1/4-inch in width that occur in high concentration (more than one per 2 square inches) should be filled. Surface blemishes due to holes or dents in form should be repaired. Discoloration should be permitted at form joints.

C. Screed Side Finishes: Top of Double Tee Roof Panel: Screed to true surfaces free from high and low areas and then float to a relatively smooth surface free from projecting gravel, footprints, or other defects to provide a finish suitable for application of fully adhered roofing system.

2.02 MATERIALS

A. Forms: Material that will provide smooth and anticipated finish.

B. Form Release Agent: Non-staining type that will not impair the anticipated finishes and will not inhibit field installed coatings, sealants, and adhesives.

C. Portland Cement: ASTM C150, Type I or III.

D. Sealer:
   1. Acceptable products include Baracade Silane 40 by Euclid Chemical Company, Pentreat 244-40 by W.R. Meadows, Sikagard SN-40 by Sika Corporation, or equal.
   2. Colorless, non-staining, non-yellowing, deep penetrating concrete water repellent compound that produces a non-filming water repellent surface while penetrating deep into the capillaries of the subsurface. Sealer shall consist of 40 percent active content silane and meet or be tested for by the following criteria:
      a. Resistance to UV: Excellent.
      b. VOC: 600 g/L or less.
      c. NCHRP No. 244 Series II: 85 percent reduction in chloride content.
      d. NCHRP No. 244 Series II: 87 percent reduction in water absorption.
      e. NCHRP No. 244 Series IV: 97 percent reductio in chloride content.
      f. ASTM D6490.
      g. ASTM E514.
   3. Sealer shall be applied to the bottom side (interior) of all roof tees.

E. Other Cementitious Materials: Ground granulated blast furnace slag meeting ASTM C989.

F. Admixtures:
   1. Air entraining admixture meeting ASTM C260.
   2. Water reducing, retarding, and accelerating admixtures meeting ASTM C494.

G. Aggregates: Meeting ASTM C33 except that coarse aggregates for precast concrete surfaces exposed to damp conditions shall contain zero iron oxides.

H. Water: Potable and free from foreign materials in amounts harmful to concrete and embedded steel.

I. Reinforcing Steel: Reinforcing steel or mesh shall be selected from the following materials to conform to the precaster's design unless otherwise indicated on the drawings. Reinforcing bars shall not be welded.
   1. Bars:
      a. Deformed billet steel: ASTM A615.
      b. Deformed rail steel: ASTM A616.
      c. Deformed axle steel: ASTM A617.
      d. Deformed low-alloy steel: ASTM A706.
   2. Wire: Cold drawn steel: ASTM A82.
   3. Wire Fabric:
      a. Welded steel: ASTM A185
      b. Welded deformed steel: ASTM A497.

J. Strand: Uncoated, 7-wire, Stress-Relieved Strand: ASTM A416-Grade 250K or 270K.

K. Anchors and Inserts–Materials:
   1. Structural Steel: ASTM A36.
      a. Shop Primer: Manufacturer's standard. Location: Items protected by sealants or finish coatings.
      b. Hot Dipped Galvanized: ASTM A153. Location: Embed anchors, inserts, plates, angles, and other items left exposed unless otherwise indicated. Cold galvanize field welds.
      c. Zinc-Rich Coating: MIL-P-2135, self-curing, one-component, sacrificial. Location: As indicated.
      d. Cadmium Coating (Electroplated). Location: As indicated.
   2. Stainless Steel: ASTM A666, Type 304. Location: As indicated.

L. Other Items Cast-In to Precast Units: Embed anchors, inserts, plates, angles, and other items at locations indicated on the drawings.

2.03 ACCESSORIES

A. Connecting and supporting devices shall be ASTM A666, Type 304 stainless steel unless noted otherwise.

B. Cement Grout: Type I (ASTM C150/C150M), "Dry Pack", Portland cement, sand and water having a minimum of 3,000 psi compressive strength at 28 days. Grout shall have an approximate 3 to 1 sand/cement ratio.

C. Bearing Bads: Selection shall be made by precast designer. Unless noted otherwise, elastomeric bearing pads conforming to Division 2, Section 25 of AASHTO Standard Specifications for Highway Bridges shall be used. Design shall be in accordance with the PCI Design Handbook, Current Edition.

D. Joint Sealants: Refer to Section 07 90 00–Caulking and Sealants.

E. Galvanized Sheet Materials: ASTM A653/A653M; G90 zinc coating.

F. Welding Materials and Studs: AWS D1.1/D1.1M, "Structural Welding Code-Steel;" compatible with materials being welded.

G. Pipe Sleeves:
   1. 3/4-inch conduit or PVC pipe to be used in hanging lighting and other items as necessary.
   2. Location to be 5 feet on-center, verify layout with electrical lighting layout.
      a. Start 2.5-feet from outside walls.
      b. Install in each roof double tee leg at 5-foot on-center. Spacing shall be uniform and consistent throughout.

c. Install sleeves above prestressing strands in double tee legs. Location to be confirmed by manufacturer.
d. Unused pipe sleeves to be sealed by Contractor.

H. Anchor Bolts: As designed by precast manufacturer, cast-in-place by others.

I. Attachment plates: As designed by precast manufacturer, cast-in-place by others.

2.04 FABRICATION

A. Double tee camber as designed by precaster in accordance with design loads.

B. Pre-stress all precast units.

C. All reinforcing steel shall have minimum cover as required by code and shall be accurately located as indicated on the approved shop drawings. Metal chairs, with or without coatings, shall not be permitted in the finished face.

D. All of the fabrication procedures shall be carried out under a fully protective overhead and sidewall covering, with a constant temperature between 50 and 80 degrees Fahrenheit being maintained except during the curing cycle.

2.05 FABRICATION TOLERANCES

A. Conform to PCI-Tolerances for Precast and Prestressed Concrete.

2.06 CONCRETE MIXES

A. 28-day compressive strength: Minimum of 5,000 psi.

B. Use of calcium chloride, chloride ions, or other salts is not permitted.

PART 3–EXECUTION

3.01 EXAMINATION

A. Verify that site conditions are ready to receive work and field measurements are as indicated on shop drawings.

B. Verify supporting structure is ready to receive work.

3.02 PREPARATION

A. Contractor shall be responsible for the following items:
1. Removal of all obstructions including, but not limited to, power lines and wires that may be hazardous to precaster’s personnel and other items required for precast installation.
2. Grid locations, building corners, finish floor elevations, top of door elevations, and other survey points/lines/elevations for accurate installation of precast units.
3. True and level bearing surfaces on all field placed bearing walls and other field placed supporting units.
4. Placement and accurate alignment of anchor bolts, plates, and other field placed supporting units.
5. Repair all concrete and bituminous surface damaged during precast installation. Examine surfaces with precaster before and after precast installation and coordinate efforts to minimize damage.

3.03 ERECTION

A. Precast installer shall be PCI Certified Erector and in good standing with PCI.

B. Erection shall be defined as:
   1. Placing, aligning, and leveling the precast units in final positions in the structure on the designated supporting surfaces. Maintain temporary bracing in place until final connection is made.
   2. Connection of precast units to each other, or to supporting structural units as indicated on the shop drawings.
   3. Removal of lifting hooks, if necessary.
   4. Cleaning and sealing of precast-to-precast joints. Joints include:
   5. Precast-to-precast including joints between interior and exterior units.
   6. Precast-to-bearing.

C. Joints Between Roof Double Tees: If the space between flanges of adjacent roof tees exceeds 3/4-inch, it shall be covered with a minimum 3-inch wide continuous 20-gauge galvanized sheet metal cover adhered on each side with plastic flashing cement. Cement shall not run into joints.

D. Field Welding: Complete field welding using qualified personnel, equipment, and welding materials that are compatible to the base material.

E. Patching: All exposed connections shall be recessed and patched per the intended use of the space they are exposed to.

3.04 ERECTION TOLERANCES

A. Erect precast units level, plumb, square, true, and in alignment without exceeding the non-cumulative erection tolerances of PCI MNL 135. Position units so that dimensional errors do not accumulate, and so joints remain aligned and uniform as erection progresses. Level out variations between adjacent units by jacking, loading, or any other feasible method as recommended by the manufacturer and acceptable to the engineer.

3.05 JOINT SEALANT INSTALLATION

A. Contractor shall coordinate with the precast erector sealing of precast joints where required. The Contractor accepts responsibility if the precast joints above the roof deck and below grade are not sealed due to poor coordination or site conditions. Install backer rod and sealant according to product manufacturer instructions.

3.06 CONCRETE SEALER INSTALLATION

A. Surfaces shall be structurally sound, clean, dry, free of dust, dirt, paint, efflorescence, laitance, curing compounds, and other contaminants that will prevent the proper penetration of the sealer.

B. Prior to application, all joints shall be properly sealed in accordance with Section 07 90 00–Caulking and Sealants.

C. Apply two coats per manufacturer recommendations and coverage rates utilizing low pressure airless spray equipment.

3.07 FIELD REPAIR AND CLEANING OF PRECAST UNITS

A. Repairs by Precast Erector: Repair chipping, spalling, cracking, and other damages to precast units after delivery to site. Consult with precaster for repairs of structural precast units.

3.08 PROTECTION

A. Contractor to protect precast units from construction operations after erection.

END OF SECTION

SECTION 03 45 00
PRECAST WALL PANELS

PART 1–GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Insulated and non-insulated wall panels with architectural surfaces as indicated on the drawings.
   2. Accessories.

B. Related Sections and Divisions:
   1. Section 03 30 00–Cast-in-Place Concrete.
   2. Section 05 50 00–Metal Fabrications.
   3. Section 07 90 00–Caulking and Sealants.
   4. Division 08–Openings.

1.02 REFERENCES

A. ACI–American Concrete Institute.

B. ACI 318–Building Code Requirements for Structural Concrete.

C. AWS–American Welding Society.

D. ICC (IBC)–2015 International Building Code.

E. PCI–Precast/Prestressed Concrete Institute.

F. PCI MNL-116–Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products.

G. PCI MNL-117–Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

H. PCI MNL-120–PCI Design Handbook - Precast and Prestressed Concrete.

I. PCI MNL-135–Tolerance Manual for Precast and Prestressed Concrete Construction.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Standard Specification Section 105.

B. Submit concrete mix information required by Standard Specification Sections 501 and 502.

C. All precast components designs shall bear the name and seal of a State of Wisconsin licensed professional engineer. Contractor shall be responsible for submitting the required additional copies of precast components drawings with original stamp and signature for submittal to the State of Wisconsin. These materials must be submitted prior to installation.

D. Shop Drawings: Include layout plans with unit locations, bearing and top of unit elevations, overall dimensions, building cross sections, wall sections, details, and opening locations.
   1. Separately elevate and dimension each type of unit. Indicate location of each unit on overall layout by using the same identification mark placed on the actual unit.

2. Detail head/jamb/sill for each type of cast-in door opening including blocking and finish intentions.
3. Indicate all cast-in openings 12-inches or larger in dimension. Label each opening as cast-in. Generally, note all other non-cast-in openings are to be cut in the field by Contractor after precaster's approval.
4. Indicate welded connections by AWS standard symbols and show size, length, and type of each weld.
5. Indicate locations of and detail hardware and anchorage devices to be cast-in to precast units with relationship to structure.
6. Indicate locations of and detail hardware and anchorage devices to be embedded into or attached to structure or other construction with relationship to structure.
7. Schedule loose hardware and anchorage devices to be installed by others. Include in schedule the identification marks, item descriptions, and total quantities.
8. Indicate locations of and detail lifting and handling devices. Use side or edge devices at all locations to minimize unsightly patching at exposed faces. Any face locations must be approved by engineer.
9. Indicate sections and details showing quantities and position of reinforcing steel and related items including special reinforcement.
10. Indicate locations of and detail solid concrete and reduced insulation zones. These types of zones are unacceptable unless absolutely necessary and must be approved by engineer prior to fabrication.
11. Indicate shim sizes and grouting sequence.
12. Handling procedures, sequence of erection, and bracing plan.

E. Include all dead, live, and other applicable loads used in design on the shop drawings.

F. Samples: Provide department with samples representing the finish color and texture of exposed surfaces when requested. Samples to be a minimum of 12 by 12 inches.

G. Submit test reports for concrete and other structural materials tested during fabrication including cement mill reports, mix reports, and cylinder break reports.

1.04 COORDINATION AND SEQUENCING

A. Coordinate opening sizes and locations, attachment of related items, and other work related to the fabrication and installation of precast concrete units.

B. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

1.05 PREINSTALLATION CONFERENCE

A. Convene a minimum two weeks prior to commencing work of this section and review the following items:
1. Approved shop drawings and installation details.
2. Anchor and weld plate locations.
3. Opening locations including those cut in the field.
4. Limitations of field cutting and core drilling.
5. Site access requirements and obstructions.
6. Cold weather grouting requirements.
7. Cleaning responsibilities and expectations.

1.06 PERFORMANCE REQUIREMENTS

A. Provide precast concrete units and connections capable of withstanding the design loads as shown on the drawings.

B. Design members exposed to weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

C. Design system to accommodate construction tolerances, deflection of other building structural members, and clearances of intended openings.

1.07 QUALITY ASSURANCE

A. Single Source Requirement: Provide precast concrete of this section and Section 03 41 00–Precast Double Tees by one manufacturer.

B. Design members exposed to weather to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

C. Fabricator Qualifications: A firm that specializes in manufacturing the types of precast concrete specified in good standing in the PCI Plant Certification Program, and that complies with the following requirements:
   1. Assumes responsibility for engineering precast concrete units to comply with the performance requirements. The responsibility includes preparation of Shop Drawings and design performed by a qualified Professional Engineer.
   2. Participates in PCI's Plant Certification Program at the time of bidding and through the construction process.
   3. Has sufficient production capacity to produce the required units without delaying the work.
   4. PCI plant possessing a Certification Category of AA or AB.
      a. Certified with 3D form surfaces.
      b. In possession of a PCI Level 3 quality control certification.
      c. Refer to PCI Certification Categories for description of categories.

D. Erector Qualifications: PCI Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years' experience in the erection of precast concrete similar to the requirements of this project.

E. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, "PCI Design Handbook–Precast and Prestressed Concrete," applicable to types of structural precast concrete units indicated.

F. Quality-Control Standard: For manufacturing procedures and testing requirements and quality control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Concrete Products" and PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products." Comply with the camber and dimensional tolerances of PCI MNL 135, "Tolerance Manual for Precast and Prestressed Concrete Construction."

G. Welder Qualifications: AWS Certified, approved by the precast concrete manufacturer, and having a minimum of 5 years' experience in the erection of precast concrete similar to the requirements of this project.

1.08 MOCK-UP

A. After samples are approved by department, provide mock-up panels including all interior and exterior finishes and textures, standard opening, insulation configuration, finish and texture transitions, and actual scale of architectural details.

1.09 DELIVERY, STORAGE, AND HANDLING

A. General Requirement: All lifting and handling, transportation and delivery, storage and support, and erection of precast panels to be performed by qualified personnel using methods and equipment approved by the manufacturer.

B. Identification: Label each unit with date of production and mark indicating unit location on the shop drawings.

C. Lifting and Handling: Lift and handle units at all times by lifting points indicated on the shop drawings. Lift with manufacturer approved lifting devices.

D. Transportation and Delivery: Transport units in accordance with manufacturer requirements.

E. Storage and Support: Store and support units off the ground with identification marks clearly visible and so lifting devices are accessible and undamaged. Separate stacked units by batten across full width of each bearing point. Protect members to prevent staining, chipping, or spalling of concrete.

1.10 WARRANTY

A. Provide twelve-month warranty for workmanship, materials, and satisfactory performance.

PART 2–PRODUCTS

2.01 PRECAST UNITS

A. Insulated Wall Panels:
1. Size/Shape/Profile: As indicated on the drawings or needed by design.
2. Panel Width: 10-feet unless noted otherwise.
3. Overall Thickness: 18-inch thick unless noted otherwise; 4-inch exterior wythe, 6-inch insulation, and 8-inch interior wythe unless noted otherwise. Thickness may change per design requirements.
4. Form Side Architectural Finish: As indicated/scheduled on the drawings, refer to finish description types below.
5. Form Side Architectural color: As indicated/scheduled on the drawings.
6. Form Side Non-Architectural Finish: Grade B (PCI), refer to description below.
7. Form Side Non-Architectural Color: Gray.
8. Screed Side Finish: Standard Float (Warehouse Grade), refer to description below.
9. Screed Side Color: Gray.
10. Screed Side (Interior) Coating: Sealer as specified.

B. Non-Insulated Wall Panels:
1. Size/Shape/Profile: As indicated on the drawings or needed by design.
2. Panel Width: 10-feet unless noted otherwise.
3. Overall Thickness: 16-inch thick unless noted otherwise. Thickness may change per design requirements.
4. Form Side Non-Architectural Finish: Grade B (PCI), refer to description below.
5. Form Side Non-Architectural Color: Gray.
6. Screed Side Finish: Standard Float (Warehouse Grade), refer to description below.
7. Screed Side Color: Gray.
8. Form and Screed Side Coating: Sealer as specified.

C. Form Side Architectural Type Finishes (PCI):
1. Exposed Aggregate Finish Types: (Pattern and finish locations as indicated on the drawings.)
    a. Water Wash Finish: Use chemical retarding agents applied to molds and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal to match accepted sample or mock-up units.

b. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to exposed aggregate and surrounding matrix surfaces after form removal to match accepted sample or mock-up units.
c. Combination of water wash and abrasive-blast finish.

2. Reveals: As indicated on the drawings.

D. Form Side Non-Architectural Type Finishes (PCI): Grade B: All air holes over 1/4-inch in size should be filled. Air holes between 1/8 and 1/4-inch in width that occur in high concentration (more than one per 2 square inches) should be filled. Surface blemishes due to holes or dents in form should be repaired. Discoloration should be permitted at form joints.

E. Screed Side Finish: Standard Float (Warehouse Grade): Screed or float finish uniformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish, float finish, if required. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. No major imperfections, honeycombing, or defects are permitted.

2.02 MATERIALS

A. Forms: Material that will provide smooth and anticipated finish.

B. Form Release Agent: Non-staining type that will not impair the anticipated finishes and will not inhibit field installed coatings, sealants, and adhesives.

C. Portland Cement: ASTM C150, Type I or III.

D. Sealer:
1. Acceptable products include Baracade Silane 40 by Euclid Chemical Company, Pentreat 244-40 by W.R. Meadows, Sikagard SN-40 by Sika Corporation, or equal.
2. Sealer shall be a colorless, non-staining, non-yellowing, deep penetrating concrete water repellent compound that produces a non-filming water repellent surface while penetrating deep into the capillaries of the subsurface. Sealer shall consist of 40 percent active content silane and meet or be tested for by the following criteria:
a. Resistance to UV: Excellent.
b. VOC: 600 g/L or less.
c. NCHRP No. 244 Series II: 85 percent reduction in chloride content.
d. NCHRP No. 244 Series II: 87 percent reduction in water absorption.
e. NCHRP No. 244 Series IV: 97 percent reductio in chloride content.
f. ASTM D6490.
g. ASTM E514.
3. Sealer shall be applied to the interior surface of all wall panels.

E. Admixtures:
1. Air entraining admixture meeting ASTM C260.
2. Water reducing, retarding, and accelerating admixtures meeting ASTM C494.

F. Aggregates: Meeting ASTM C33 except that coarse aggregates for precast concrete surfaces exposed to damp conditions shall contain zero iron oxides.

G. Water: Potable and free from foreign materials in amounts harmful to concrete and embedded steel.

H. Reinforcing Steel: Reinforcing steel or mesh shall be selected from the following materials to conform to the precaster’s design unless otherwise indicated on the drawings. Reinforcing bars shall not be welded.
1. Bars:
a. Deformed billet steel: ASTM A615.
b. Deformed rail steel: ASTM A616.
c. Deformed axle steel: ASTM A617.

d. Deformed low-alloy steel: ASTM A706.
e. Wire: Cold drawn steel: ASTM A82.

2. Wire Fabric:
a. Welded steel: ASTM A185.
b. Welded deformed steel: ASTM A497.

I. Strand: Uncoated, 7-wire, Stress-Relieved Strand: ASTM A416-Grade 250K or 270K.

J. Anchors and Inserts–Materials:
1. Structural Steel: ASTM A36.
a. Shop Primer: Manufacturer's standard. Location: Items protected by sealants or finish coatings.
b. Hot Dipped Galvanized: ASTM A153. Location: Embed anchors, inserts, plates, angles, and other items left exposed unless otherwise indicated. Cold galvanize field welds.
c. Zinc-Rich Coating: MIL-P-2135, self-curing, one-component, sacrificial. Location: As indicated.
d. Cadmium Coating (Electroplated). Location: As indicated.
2. Stainless Steel: ASTM A666, Type 304. Location: As indicated.

K. Sandwich Panel Insulation:
1. Expanded Polystyrene (Bead Board) Insulation: 1.0 pound density board or as required for design.
2. Panels shall be insulated as shown on drawings.

L. Wythe Connectors: Maximum connector size to be 12-gauge stainless steel pin to adequately tie the two wythe together.

M. Other Items Cast-In to Precast Units: Embed anchors, inserts, plates, angles, and other items at locations indicated on the drawings.

2.03 ACCESSORIES

A. Connecting and supporting devices shall be ASTM A666, Type 304 stainless steel unless noted otherwise.

B. Cement Grout: Type I (ASTM C150/C150M), "Dry Pack", Portland cement, sand and water having a minimum of 3,000 psi compressive strength at 28 days. Grout shall have an approximate 3 to 1 sand/cement ratio. Use Cement Grout unless Non-Shrink Grout is specifically indicated by precaster.

C. Non-Shrink Cement Grout: Per ASTM C1107/C1107M, Type III (ASTM C150/C150M), "Dry Pack", Portland cement, sand, and water having a minimum of 10,000 psi compressive strength at 28 days.

D. Bearing Bads: Selection shall be made by precast designer. Unless noted otherwise, elastomeric bearing pads conforming to Division 2, Section 25 of AASHTO Standard Specifications for Highway Bridges shall be used. Design shall be in accordance with the PCI Design Handbook, Current Edition.

E. Joint Sealants: Refer to Section 07 90 00–Caulking and Sealants.

F. Galvanized Sheet Materials: ASTM A653/A653M; G90 zinc coating.

G. Welding Materials and Studs: AWS D1.1/D1.1M, "Structural Welding Code-Steel;" compatible with materials being welded.

H. Anchor Bolts: As designed by precast manufacturer, cast-in-place by others.

I. Attachment plates: As designed by precast manufacturer, cast-in-place by others.

2.04 FABRICATION

A. Cast all wall panels with architectural finish face down.

B. Pre-stress each wythe of flat panel.

C. Achieve architectural finishes only by techniques specified within this specification.

D. Cast-in preservative treated 2x wood blocking at perimeter of window and personnel door openings. Wood nailers shall provide adequate backing for installation of window and door units. Return face finish to edge of blocking/insulation.

E. Cast solid concrete edges at the perimeter of overhead door type openings unless otherwise noted; 2-inch think minimum. Return face finish to interior side of panel.

F. All reinforcing steel shall have minimum cover as required by code and shall be accurately located as indicated on the approved shop drawings. Metal chairs, with or without coatings, shall not be permitted in the finished face.

G. Composite design is acceptable when approved by engineer.

H. All of the fabrication procedures shall be carried out under a fully protective overhead and sidewall covering, with a constant temperature between 50 and 80°Fahrenheit being maintained except during the curing cycle.

2.05 FABRICATION TOLERANCES

A. Conform to PCI-Tolerances for Precast and Prestressed Concrete.

2.06 CONCRETE MIXES

A. 28-day compressive strength: Minimum of 5,000 psi.

B. Use of calcium chloride, chloride ions, or other salts is not permitted.

PART 3–EXECUTION

3.01 EXAMINATION

A. Verify that site conditions are ready to receive work and field measurements are as indicated on shop drawings.

B. Verify supporting structure is ready to receive work.

3.02 PREPARATION

A. Contractor shall be responsible for the following items:
   1. Removal of all obstructions including, but not limited to, power lines and wires that may be hazardous to precaster’s personnel and other items required for precast installation.
   2. Grid locations, building corners, finish floor elevations, top of door elevations, and other survey points/lines/elevations for accurate installation of precast units.
   3. True and level bearing surfaces on all field placed bearing walls and other field placed supporting units.
   4. Placement and accurate alignment of anchor bolts, plates, and other field placed supporting units.
   5. Repair all concrete and bituminous surface damaged during precast installation. Examine surfaces with precaster before and after precast installation and coordinate efforts to minimize damage.

3.03 ERECTION

A. Precast installer shall be PCI Certified Erector and in good standing with PCI.

B. Erection shall be defined as:
   1. Placing, aligning, and leveling the precast units in final positions in the structure on the designated supporting surfaces. Maintain temporary bracing in place until final connection is made.
   2. Connection of precast units to each other, or to supporting structural units as indicated on the shop drawings.
   3. Removal of lifting hooks, if necessary.
   4. Cleaning and sealing of precast-to-precast joints. Joints include:
   5. Precast-to-precast including joints between interior and exterior units.
   6. Precast-to-bearing.

C. Field Welding: Complete field welding using qualified personnel, equipment, and welding materials that are compatible to the base material.

D. Grouting:
   1. Pack grout between bottom of precast walls and their bearing surfaces filling the entire area free of voids. Rake joints back at locations where backer rod and sealant is to be installed.
   2. Contractor shall be responsible for providing necessary cold weather procedures for grouting when temperatures are below 40 degrees Fahrenheit for a 24 hour period.

E. Patching: All exposed connections shall be recessed and patched per the intended use of the space they are exposed to.

3.04 ERECTION TOLERANCES

A. Erect precast units level, plumb, square, true, and in alignment without exceeding the non-cumulative erection tolerances of PCI MNL 135. Position units so that dimensional errors do not accumulate, and so joints remain aligned and uniform as erection progresses. Level out variations between adjacent units by jacking, loading, or any other feasible method as recommended by the manufacturer and acceptable to the engineer.

3.05 JOINT SEALANT INSTALLATION

A. Contractor shall coordinate with the precast erector sealing of precast joints where required. The Contractor accepts responsibility if the precast joints above the roof deck and below grade are not sealed due to poor coordination or site conditions. Install backer rod and sealant according to product manufacturer instructions.

3.06 CONCRETE SEALER INSTALLATION

A. Surfaces shall be structurally sound, clean, dry, free of dust, dirt, paint, efflorescence, laitance, curing compounds, and other contaminants that will prevent the proper penetration of the sealer.

B. Prior to application, all joints shall be properly sealed in accordance with Section 07 90 00.

C. Apply two coats per manufacturer recommendations and coverage rates utilizing low pressure airless spray equipment.

3.07 FIELD REPAIR AND CLEANING OF PRECAST UNITS

A. Repairs by Precast Erector: Repair chipping, spalling, cracking, and other damages to precast units after delivery to site. Consult with precaster for repairs of structural precast units.

3.08 CLEANING BY PRECAST ERECTOR

A. Protect adjacent work, buildings, and landscaping from damaged caused by cleaning.

B. Exterior Architectural Finishes: Wash and clean architectural finishes to remove road film, effloresces, and to even out color variations from panel to panel. Precast units shall be cleaned only after installation procedures, including joint treatment, are completed. Perform cleaning and rinsing procedures in accordance with precast manufacturer's recommendations.

C. Interior Face of Architecturally Finished Panels: Washing and cleaning is not part of the work covered by the precaster. Color streaking will be evident on the backside/interior of architecturally finished panels.

3.09 PROTECTION

A. Contractor to protect precast units from construction operations after erection.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Shop-fabricated carbon steel items, including pipe bollards.

1.02 REFERENCES

A. ASTM A36–Carbon Structural Steel.

B. ASTM A53–Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

C. ASTM A123–Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

D. ASTM A143–Practice for Safeguarding Against Embrittlement of Hot-Dipped Galvanized Structural Steel Products and Procedure for Detecting Embrittlement.

E. ASTM A153–Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

F. ASTM A307–Carbon Steel Bolts, Studs, and Threaded Rod 60,000 psi Tensile Strength.

G. ASTM A384–Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies.

H. ASTM A385–Practice for Providing High-Quality Zinc Coatings (Hot-Dip).

I. ASTM A500–Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

J. ASTM A780–Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

K. ASTM A1008–Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

L. ASTM A1011–Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

M. AWS A2.0–Standard Symbols for Welding, Brazing, and Nondestructive Examination.

N. AWS D1.1–Structural Welding Code–Steel.

O. Standard Specifications: Unless otherwise indicated, Standard Specifications within this section shall refer to the State of Wisconsin Standard Specifications for Highway and Structure Construction, Current Edition.

1.03 DESIGN REQUIREMENTS

A. All fabrications shall meet applicable code requirements including OSHA.

1.04 SUBMITTALS FOR REVIEW

A. Comply with pertinent provisions of Standard Specification Section 105.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, sections, elevations, and details where applicable.

C. Mill Test Reports: Submit indicating structural strength and composition.

D. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

A. Fabricate steel members in accordance with AISC Code of Standard Practice.

B. Welders Certificates: Certify welders employed on the work, verifying AWS qualification within the previous 12 months.

1.06 QUALIFICATIONS

A. Qualify welding processes and welding operators in accordance with AWS *Standard Qualifications Procedures*.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver all materials to job site properly marked to identify the structure for which it is intended and at such intervals to ensure uninterrupted progress of the work. Marking shall correspond to markings indicated on the shop drawings.

B. Store all members off the ground using pallets, platforms, or other supports.

C. Do not store materials on the structure in a manner that might cause distortion or damage to the members of the supporting structures.

D. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to department.

PART 2–PRODUCTS

2.01 MATERIALS–CARBON STEEL

A. Steel Sections:
   1. ASTM A36 (channels, angles, plates).
   2. Pipe: ASTM A53, Grade B.
   3. Silicon content of steel members to be hot-dipped galvanized shall be in the range of 0 to 0.04%. Submit mill test reports confirming compliance.

B. Plain Washers: Round carbon steel complying with FS FF-W-92.

C. Bolts, Threaded Rods, and Nuts: ASTM A307 Grade A, or galvanized to ASTM A153 for galvanized components for exterior use and where built into exterior walls.

D. Lock Washers: Helical spring-type carbon steel complying with FS FF-W-84.

E. Welding Electrodes: Comply with AWS D1.1. E70XX electrodes for carbon steel. For ASTM A992 steel and any other steel with 50 ksi or greater yield strength, use only E7018 or other E70XX electrodes specifically permitted by AWS D1.1.

F. Select fasteners for the type, grade, and class required.

2.02 FABRICATION

A. Fabrication and Assembly:
1. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on the approved shop drawings.
2. Properly mark and match-mark materials for field assembly and for identification as to structure and site for which intended.
3. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
4. Where finishing is required, complete the assembly, including welding of units, before start of finishing operation.
5. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.

B. Connections:
1. Bolts and washers of all types and sizes shall be provided for completion of all field erection.
2. Comply with AWS Code for procedures, appearance, and quality of welds used in correcting welded work.
3. Assemble and weld built-up sections to produce true alignment of axes without warp.
4. Welding shall be done by the shielded arc process.
5. All welds shall be chipped, ground smooth, and primed immediately after fabrication.

C. Workmanship:
1. Use materials of size and thickness shown or, if not shown, of size and thickness to produce strength and durability in the finished product.
2. Work to dimensions shown or accepted on the Shop drawings using proven details of fabrication and support.
3. Form exposed work true to line and level, with accurate angles and surfaces, and with straight sharp edges.
4. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing works.
5. Cap all open ends of pipe and structural tubing.
6. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush; match and blend with adjoining surfaces.
7. Provide for anchorage of the type shown. Coordinate with supporting structures. Fabricate and space the anchoring devices to provide adequate support for intended use.
8. Cut, reinforce, drill, and tap miscellaneous metal work as indicated to receive hardware and similar items.

2.03 FINISHES

A. Do not prime surfaces where galvanizing or field welding is required.

B. Galvanizing:
1. All items, except piping designated to be galvanized, shall be hot-dipped galvanized in accordance with ASTM Specification A123 and A153. Piping shall be hot-dipped galvanized in accordance with ASTM A53. Furnish a Certificate of Compliance stating that the galvanizing complies with ASTM Specifications and Standards and all other applicable requirements specified herein.
2. Fabrication of items to be galvanized shall be in accordance with ASTM A143, A384, and A385. Structural steel shall be fabricated generally in accordance with Class 1 guidelines as shown in *Recommended Details for Galvanized Structures* as published by the American Hot Dip Galvanizer's Association, Inc.

3. Galvanized items shall be handled, transported, and stored to prevent damage or staining to the coating. Maintain adequate ventilation and continuous drainage.
4. Silicon content for steel to be hot-dipped galvanized shall be in the range of 0 to 0.04%.
5. Steel work shall be precleaned utilizing a caustic bath, acid pickle and flux, or shall be blast cleaned and fluxed. In either case, all surface contaminants and coatings shall be removed.
6. All welding shall be performed in accordance with the American Welding Society publication D19.0-72, *Welding Zinc Coated Steel*. All uncoated weld areas shall be touched up.

PART 3–EXECUTION

3.01 EXAMINATION

A. Correct conditions detrimental to the proper and timely completion of the work.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages such as concrete inserts, anchor bolts, and miscellaneous items having integral anchors which are to be embedded in concrete construction.

B. Coordinate delivery of such items to project.

C. Clean and strip primed steel items to bare metal where site welding is required.

3.03 FIELD WELDING

A. Comply with AWS Code for procedures of manual shielded metal arc welding (steel, stainless steel) and gas metal arc welding (aluminum), appearance and quality of weld made, and methods in correcting welding work.

3.04 TOUCH-UP PAINTING

A. 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 in accordance with Section 09 91 00–Painting.

3.05 GALVANIZING REPAIR

A. Areas damaged by welding, flame-cutting, or during handling, transport, or erection shall be repaired by one of the following methods whenever damage exceeds 3/16 inch in width.
   1. Cold Galvanizing Compound:
      a. Surfaces to be reconditioned with zinc-rich paint shall be clean, dry, and free of oil, grease, and corrosion products.
      b. Areas to be repaired shall be power disc-sanded to bright metal. To provide a smooth reconditioned coating can be effected, surface preparation shall extend into the undamaged galvanized coating.
      c. Touch-up paint shall be an organic cold-galvanized compound having a minimum of 94% zinc dust in the dry film.
      d. The paint shall be spray- or brush-applied in multiple coats until a dry film thickness of 8 mils minimum has been achieved. A finish coat of aluminum paint shall be applied to provide a color blend with the surrounding galvanizing.
      e. Coating thickness shall be verified by measurements with a magnetic or electromagnetic gauge.

2. Zinc-Based Solder:
    a. Surfaces to be reconditioned with zinc-based solder shall be clean, dry, and free of oil, grease, and corrosion products.
    b. Areas to be repaired shall be wire-brushed.
    c. Heat shall be applied slowly and broadly close to but not directly onto the area to be repaired. The zinc-based solder rod shall be rubbed onto the heated metal until the rod begins to melt. A flexible blade or wire brush shall be used to spread the melt over the area to be covered. The zinc-based solder shall be applied in a minimum thickness of 2 mils.
    d. Coating thickness shall be verified by measurements with a magnetic or electromagnetic gauge.

3.06 SCHEDULE

A. The following schedule is a list of principal items only. Refer to Drawing details for items not specifically scheduled.

B. Pipe Bollards: Steel pipe concrete-filled, crowned cap, as detailed-galvanized and field finish paint in accordance with Division 09.

C. Door Frames for Overhead Door Openings: Sill angle sections-galvanized finish.

END OF SECTION

SECTION 05 56 00

ANCHOR BOLTS AND POST-INSTALLED ANCHORS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Anchor bolts, expansion bolts, adhesive anchors, and screw anchors.

1.02 REFERENCES

A. ASTM A36/A36M–Standard Specification for Carbon Structural Steel.

B. ASTM F1554–Anchor Bolts, Steel, 36, 55, and 105-ksi yield strength.

C. ICC-ES International Code Council–Evaluation Service.

D. AC 193–Acceptance Criteria for Mechanical Anchors in Concrete Elements.

E. AC 308–Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete.

F. ACI 355.2–Qualification of Post-Installed Mechanical Anchors in Concrete and Commentary.

G. ACI 355.4–Qualification of Post-Installed Adhesive Anchors in Concrete and Commentary.

H. Standard Specifications: Unless otherwise indicated, Standard Specifications within this section shall refer to the State of Wisconsin Standard Specifications for Highway and Structure Construction, Current Edition.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Standard Specification Section 105 for anchor bolts, post-installed anchors, any other accessories.

PART 2–PRODUCTS

2.01 ANCHOR BOLTS

A. Anchor bolts complete with washers and nuts shall be fabricated as shown or as specified by the equipment manufacturer and unless otherwise indicated shall be hot-dip galvanized carbon steel. Anchor bolts shall, as a minimum, conform to the requirements of ASTM F1554-Grade 36.

2.02 EXPANSION BOLTS

A. Expansion bolts shall be KWIK Bolt TZ by Hilti, Inc., Power-Stud + SD2, SD4, or SD6, by DeWalt, or Strong-Bolt 2 by Simpson Strong-Tie Anchor Systems, or approved equal.

B. All expansion bolts shall comply with the Wisconsin Commercial Building Code, AC 193, and ACI 355.2. They shall be ICC-ES approved for use in cracked and uncracked concrete.

C. Expansion bolts will not be permitted as substitutes for embedded anchor bolts except with the prior written acceptance of engineer or where otherwise specifically called for.

2.03 ADHESIVE ANCHORS

A. Adhesive anchors shall be HIT HY 200 by Hilti, Inc., Red Head C6+ or Red Head A7+ by ITW, Pure 110+ or AC200+ by DeWalt, Set-XP by Simpson Strong-Tie Anchor Systems, or approved equal.

B. All adhesive anchors shall comply with the Wisconsin Commercial Building Code, AC 308, and ACI 355.4. They shall be ICC-ES approved for use in cracked and uncracked concrete.

PART 3–EXECUTION

3.01 ANCHOR BOLTS

A. Anchor bolts for structural members shall be located as shown and specified.

B. Anchor bolts for mechanical equipment shall have embedment length, edge distances, and spacing as required by the equipment manufacturer.

C. All dirt or foreign materials shall be removed prior to embedding into concrete. After anchor bolts have been embedded, their threads shall be protected by grease and by installing the nuts or by other means until the time of installation of the equipment or metal work.

3.02 EXPANSION BOLTS

A. Unless otherwise noted on the drawings, expansion bolt edge distance and spacing shall be in accordance with manufacturer’s printed installation instructions.

B. Bolt embedment shall at least equal 6-bolt diameters.

C. Installation procedures shall be in accordance with the manufacturer’s printed installation instructions.

D. Where location of bolts is adjustable, reinforcing steel shall be located prior to drilling holes and bolts shall be located to clear reinforcing steel.

3.03 ADHESIVE ANCHORS

A. At locations shown on the drawings, reinforcing bars or threaded rod shall be provided in existing concrete by drilling holes, injecting epoxy adhesive, and inserting the reinforcing bar.

B. All existing surfaces to receive adhesive anchors, including the entire area in contact with the new concrete, shall be cleaned and roughened to amplitude of 1/4 inch.

C. Installation procedures shall be in accordance with the manufacturer’s printed installation instructions.

D. Where location of anchors is adjustable, reinforcing steel shall be located prior to drilling holes and anchors shall be located to clear reinforcing steel.

END OF SECTION

SECTION 07 53 00
SINGLE-PLY ROOFING FULLY ADHERED

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Rigid Roof Insulation.
   2. Protection Board.
   3. Membrane Roofing and Related Accessories.

1.02 REFERENCES

A. NRCA (National Roofing Contractors' Association)–Roofing and Waterproofing Manual.

1.03 SUBMITTALS

A. Submittals shall comply with provisions of Standard Specification Section 105.

B. Submit the following:
   1. Tapered insulation layout plan.
   2. Roofing layout plan.
   3. Flashing, joint, and termination details.
   4. Product data for all products specified in this section.
   5. Manufacturer's installation instructions.
   6. Copy of system warranty.

1.04 QUALITY ASSURANCE

A. The membrane must be manufactured by the material supplier. Manufacturer's supplying membrane made by others are not acceptable.

B. Unless otherwise noted, the roofing contractor must strictly comply with the manufacturer's current specifications and details.

C. The roofing system must be installed by an applicator authorized and trained by the manufacturer in compliance with shop drawings as approved by the manufacturer. The roofing applicator shall be thoroughly experienced and upon request be able to provide evidence of having at least 5 years successful experience installing single-ply roofing systems and having installed at least one roofing application or several similar systems of equal or greater size withing one year.

D. Upon completion of the installation, the applicator shall arrange for an inspection to be made by a nonsales technical representative of the membrane manufacturer in order to determine whether or not corrective work will be required before the warranty will be issued. Notify the department 72 hours prior to the manufacturer's final inspection.

1.05 WARRANTY

A. Furnish to department the roofing manufacturer's 15-year total system warranty covering the costs of all labor and materials required to repair any leaks and any defects in the roofing system. All products and applications required by the roof

manufacturer to obtain the warranty shall be included. Department will not pay for the roofing system unless the warranty is issued by the manufacturer.

PART 2–PRODUCTS

2.01 ROOF INSULATION

A. Roof insulation for crickets for positive drainage at scuppers shall be Type 2, 1.35 pcf molded polystyrene tapered board insulation, sloped as shown on the drawings. Roof insulation shall be approved by roofing manufacturer for use in the roofing system.

2.02 PROTECTION BOARD

A. Provide a protection board over the entire roof surface that is a minimum 1/2-inch-thick material as approved by the roofing manufacturer for use in this system.

2.03 MEMBRANE, FLASHING, AND ACCESSORIES

A. Roofing membrane shall be nonreinforced EPDM, 0.060-inch thick.

B. Acceptable systems include the following, or equal:
   1. Sure-Seal, Design A Adhered System by Carlise SynTec Systems, Division of Carlise Corporation.
   2. RubberGuard Adhered System by Firestone Building Products Company.
   3. JM EPDM NR by Johns Manville.

C. Flashing shall be a minimum 0.060-inch-thick neoprene or EPDM sheet flashing provided by the roofing manufacturer. All adhesives, sealants, splicing tape, fastening strips, fasteners, and all accessories necessary to complete the system shall be provided by the roofing manufacturer.

PART 3–EXECUTION

3.01 SURFACE PREPARATION

A. Surfaces on which the roofing system is to be applied shall be clean, smooth, dry, and free of fins, sharp edges, loose and foreign materials, oil, grease, and all contaminants that would be detrimental to the bonding of the roof system. The condition of the roof deck shall be approved by the roofing manufacturer before the membrane is applied.

3.02 INSTALLATION

A. Wood nailers shall be provided around the perimeter of the roof as required by the roofing manufacturer. Lumber for nailers shall be “standard” grade Douglas Fir, No. 2 Southern Pine, or better, graded in accordance with WWPA, WCLIB, NLGA, or SPIB grading rules as applicable. Lumber shall bear the garding agencies stamp. Wood shall be kiln-dried with a moisture content not to exceed 19% at time of installation. All lumber furnished shall be pressure-treated with a chromated copper arsenate (CCA) waterborne preservative treatment to a minimum retention of 0.40 pounds per cubic foot. Nailers shall be firmly anchored to the deck to resist a force of 200 pounds per linear foot. A minimum of three anchors shall be used to anchor each length of nailer, with 1/2-inch vent left between length of nailers. Provide approved nailing strip at perimeter of roof.

B. Insulation and fiberboard shall be adhered to concrete deck with adhesive approved by the roofing manufacturer. Any other requirements of the roofing manufacturer shall be complied with. Slope of roof insulation shall be as shown on the drawings, but in no case shall be less than the minimum slope required by the roofing manufacturer.

C. The roofing membrane and accessories shall be furnished and installed in accordance with the manufacturers' recommendations. Lap adjacent sheets a minimum of 3-inches. Seams shall be sealed and covered with splicing cement. A bead of lap sealant shall be applied to completely cover the splice edge providing a second independent seam seal. All seams shall be taped with an approved seam tape and installed in accordance with the manufacturer's recommendations.

D. Flashing shall be provided at all vertical surfaces, roof interruptions, and penetrations in accordance with membrane manufacturer's recommendations. All flashings and terminations shall be securely fastened with fasteners recommend by the system manufacturer. Membrane edges or flashing shall be mechanically fastened to the nailer at maximum of 8-inch centers.

E. No unit having defects shall be installed. Water shall not be allowed beneath any completed section of roof. Temporary water cutoffs may be made by extending the membrane beyond the insulation and setting the end of the membrane in a sealant. All water cutoffs shall be removed prior to proceeding with the next day's work.

END OF SECTION

SECTION 07 71 00

MANUFACTURED ROOF SPECIALTIES

PART 1–GENERAL

1.01 SUMMARY

A. Work includes scuppers.

1.02 REFERENCES

A. ASTM A653–Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM A924–General Requirements for Steel Sheet, Metallic Coated by the Hot-Dip Process.

C. SMACNA–Architectural Sheet Metal Manual.

1.03 SUBMITTALS

A. Submittals shall comply with provisions of Standard Specification Section 105.

B. Shop Drawings: Submit fabrication details, jointing details, fastening methods, and termination details.

1.04 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA standard details and requirements.

1.05 WARRANTY

A. Kynar 500 coating shall be provide with a 20-year guarantee against cracking, chipping, peeling, and fading.

PART 2–PRODUCTS

2.01 MATERIALS

A. Galvanized Steel Sheet: 24 gauge meeting ASTM A525, Grade A with G90 zinc coating.

B. Fasteners: Same material and finish as flashing sheet. Stainless steel fasteners may be used with any flashing material. Provide soft neoprene washers with fasteners.

C. Primer: Zinc chromate type.

D. Protective Backing Paint: Bituminous type.

E. Sealant: See Section 07 90 00-Caulking and Sealants.

F. Bedding Compound: Rubber asphalt or butyl type.

G. Plastic Cement: ASTM D4586, Type I or Type II.

2.02 FABRICATION

A. Scuppers shall be formed to the configurations shown on the drawings, or in accordance with SMACNA standard details. Form section true to shape, accurate in size, square, and free from buckles, kinks, and other defects.

B. All exposed edges shall be folded or returned on themselves at least 1/2 inch. Corners shall be mitered and seamed.

C. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form a drip.

2.03 FINISH

A. Back paint all sheet metal with apshaltum paint where sheet metal surfaces come into contact with concrete or steel.

B. Finish on all products shall be a 1.0 mil DFT two-coat factory-applied Kynar 500 fluoropolymer coating over an epoxy prime coat. Colors shall be selected by department.

PART 3–EXECUTION

3.01 INSTALLATION

A. Fit tight in place, Make corners square, surface true and straight in planes, and line accurate to profiles. Seal metal joints watertight.

B. Secure scuppers in place using concealed fasteners.

END OF SECTION

SECTION 07 71 23

DOWNSPOUTS

PART 1–GENERAL

1.01 SUMMARY

A. Work includes aluminum downspouts.

1.02 REFERENCES

A. ASTM B209–Aluminum and Aluminum Alloy Sheet and Plate.

B. SMACNA–Architectural Sheet Metal Manual.

1.03 DESIGN REQUIREMENTS

A. Conform to SMACNA manual for sizing components for a 10-year storm event. Perform work in accordance with SMACNA standard details and requirements.

1.04 SUBMITTALS

A. Submit shop drawings in accordance with Standard Specification Section 105 for downspouts and any accessories.

PART 2–PRODUCTS

2.01 DOWNSPOUTS

A. Downspouts shall be constructed of 0.032-inch-thick aluminum sheet conforming to ASTM B209 and shall be made from the same manufacturer scupper system.

2.02 ACCESSORIES

A. Anchorage devices shall be SMACNA or manufacturer’s requirements.

B. Downspout support shall be brackets of the appropriate size and spacing.

C. Fasteners shall be aluminum or stainless steel.

2.03 FABRICATION

A. Form downspouts to SMACNA requirements.

B. Fabricate with required connection pieces.

C. Form sections square, true, an accurate in size, in maximum possible lengths, free of distortion or defects detrimental to appearance or performance.

D. Hem exposed edges of material.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install downspouts and accessories with manufacturer’s instructions.

B. Flash and seal downspouts to scuppers.

END OF SECTION

SECTION 07 90 00

CAULKING AND SEALANTS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Caulking and sealants on the project, including primers and backer rod material.

1.02 REFERENCES

A. ASTM C920–Elastomeric Joint Sealants.

1.03 SUBMITTALS

A. Submittals shall comply with provisions of Standard Specification Section 105.

B. Submit copies of warranty.

1.04 WARRANTY

A. Caulked joints shall be weathertight and guaranteed watertight by installer for two years from installation.

B. Provide manufacturer's standard 5-year product warranty.

PART 2–PRODUCTS

2.01 CAULK–GENERAL

A. Caulk for applications in all locations shall be a one-part polyurethane sealant.

B. Acceptable products include the following, or equal:
1. Masterseal NP1 by Master Builders Solutions.
2. Vulkem 116 by Tremco, Inc. (exterior applications only).
3. Dymonic 100 by Tremco, Inc.

2.02 ACCESSORIES

A. Backer rod shall be flexible, closed-cell polyethylene rod stock sized to be under at least 25% compression when positioned in the joint. In shallow joints and where backer rod is not used, polyethylene bond breaker tape shall be used. It is essential that the caulk bond to the side of the joint but not to the base of the joint.

B. Primer(s) shall be used where required by the manufacturer for the specific product(s) used and the specific application(s) intended. Specific product(s) shall be as recommended by the manufacturer.

C. Cleaning fluid shall be methyl ethyl ketone (MEK), methyl isopropyl ketone (MIK), or similar solvent material which will not etch or mar metal finishes and shall be the product of a nationally recognized manufacturer, of type expressly recommended for use with the caulking or sealant compound used.

PART 3–EXECUTION

3.01 INSTALLATION

A. Seal completely all joints around entire perimeter of all openings in all exterior walls (inside and outside faces), including joints at all exterior doors, windows, louvers, sills, and elsewhere as noted on the drawings and as necessary to seal all open joints in the building in a complete manner. Joints in exterior walls shall be caulked in a completely weathertight manner. Joints between interior walls and concrete ceilings and other interior joints shall be caulked as indicated on the drawings. Caulking not specified in other sections shall be performed under this heading.

B. All caulking shall be done in accordance with manufacturer's specifications. Allow minimum 28-day curing period for concrete, grout, or mortar prior to caulking unless requested otherwise. Caulking work shall be done before the final coat of paint or sealant is applied except at moving joints which shall be finish painted before caulking or caulking shall be protected during painting. All caulking shall occur only when the temperature is above 40°F.

C. Joints shall be thoroughly cleaned and primed before caulking in accordance with manufacturer's instructions. Unless otherwise shown, joints shall be square in cross section 1/2-inch by 1/2-inch and shall comply with manufacturer's joint width/depth ratio limitations.

D. Backer rod shall be used in all openings 3/4 inches or more in depth and shall be tightly packed to completely fill the space to 1/2-inch back of face. The 1/2-inch shall then be filled with caulking compound.

E. Caulking shall be done by hand gun. Compound shall be driven into joint grooves with sufficient pressure to force out all air and fill joint grooves solidly. Caulking where exposed shall be free of wrinkles and shall be uniformly smooth.

F. At completion of caulking, clean off all excess material from adjoining surfaces and material. Entire installation shall be left in a perfect appearing weathertight condition.

END OF SECTION

SECTION 08 22 10
FIBERGLASS DOORS AND FRAMES

PART 1–GENERAL

1.01 SUMMARY

A. Work includes: Fiberglass doors and frames.

1.02 SUBMITTALS

A. Submittals shall be in accordance with provisions of Standard Specification Section 105.

1.03 WARRANTY

A. Provide manufacturer's 20-year warranty against failure due to corrosion.

PART 2–PRODUCTS

2.01 MANUFACTURERS

A. Acceptable products include the following, or equal:
   1. CORRIM Company, Oshkosh, Wisconsin.
   2. Special-Lite, Decatur, Michigan.
   3. Edgewater Door, Neenah, Wisconsin.

2.02 MATERIALS

A. Resins:
   1. Manufacturer's formulation for corrosion-resistant resin system with light-stabilizing additives.
   2. Minimum glass fiber to resin ratio: 40%.

B. Anchors: Manufacturer's standard stainless steel expansion anchors for existing openings and stainless steel masonry tee anchors for new construction.

C. Fasteners: Stainless steel.

2.03 DOORS

A. Thickness: 1 3/4 inches.

B. Construction:
   1. Core: Polyurethane foam.
   2. Face Sheets: FRP molded in one continuous piece, resin reinforced with hand-laid glass fiber mat, nominal 0.120 inch thick, minimum 15 mil gel-coated surface.
   3. Stiles and rails shall be 1 1/2-inch square pultruded fiberglass tubes. Provide polymer blocking for all hardware reinforcing.

C. Edges: Smooth, seamless finish.

2.04 FIBERGLASS FRAMES

A. Construction: One-piece pultruded fiberglass-reinforced plastic with minimum 3/16-inch wall thickness, jamb-to-head joints mitered and reinforced with FRP clips and stainless-steel fasteners; providing for performance equivalent to minimum 16-gauge steel frames.

B. Frames Profile: 5 3/4 inches deep, 2 inches wide face; double-rabbeted with 5/8-inch-high stop. Provide 4-inch head frames in masonry openings.

2.05 HARDWARE

A. All doors and frames shall be mortised and reinforced with polymer blocking for all hardware in accordance with the manufacturer.

B. Remainder as specified in Section 08 71 00–Door Hardware and called for in Door Schedule.

C. All fasteners shall be 316 stainless steel.

2.06 FINISH

A. All doors and frames shall have a 15 mil gel-coat finish. Color for doors and frames shall match and be selected from the manufacturer's standard color chart.

PART 3–EXECUTION

3.01 INSTALLATION

A. Set all doors and frames as supplied by manufacturer. Use stainless steel masonry anchors to support the frame.

B. Hang all doors allowing for expansion and contraction at time of setting.

C. Set all hardware in accordance with templates as supplied by hardware supplier.

D. Examine hardware at completion; test, oil, grease, and adjust as needed for smooth operation.

E. Maintain plumb and level tolerances as specified in manufacturer's installation instructions.

3.02 SCHEDULE

A. See Door Schedule on plans.

END OF SECTION

SECTION 08 33 23

OVERHEAD COILING DOORS

PART 1–GENERAL

1.01 SUMMARY

A. Work includes exterior mounted overhead coiling doors with electric operation, operating hardware, controls, and supports.

1.02 REFERENCES

A. ASTM A653–Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ANSI/NFPA70–National Electrical Code.

1.03 SUBMITTALS

A. Submittals shall be in accordance with provisions of Standard Specification Section 105.

1.04 REGULATORY REQUIREMENTS

A. Conform to the National Electric Code for motor and motor control requirements.

B. Products requiring electrical connection shall be listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2–PRODUCTS

2.01 MATERIALS

A. Provide unobstructed rectangular entrance openings as shown on the drawings, nominal dimensions to be 30-feet high by 20-feet wide.
   1. Provide exterior mounted overhead coiling door with electric motor operation and all operating hardware, controls, and supports.
   2. Design door for 20 pounds per square foot minimum wind load. Supply and install all head and jamb framing and blocking as required by door manufacturer.
   3. Curtain Slats: Curtain slats shall be minimum 20-gauge galvanized steel, with profile and size necessary for door dimensions shown the drawings.
   4. Bottom Bar: The bottom bar shall be comprised of two galvanized steel angles bolted back to back with minimum 1/8 inch thickness and have a loop-type weather seal.
   5. Guides: Provide guides consisting of three galvanized structural steel angles with a minimum thickness of 3/16-inch. Provide full height PVC weather seals contacting both interior and exterior surface of the curtain to minimize airflow.
   6. Brackets: Brackets shall be minimum 3/16-inch-thick galvanized steel plate to support the barrel, counterbalance, and hood. Provide intermediate support brackets, as necessary.
   7. Counterbalance: Counterbalance shall be helical torsion springs housed in a steel pipe barrel, supporting the curtain with a deflection limited to 0.03 inches per foot of width. Counterbalance shall be adjustable by means of an external adjusting tension wheel and designed for a minimum 20,000 cycles.
   8. Hood/Enclosure: Hood shall be 24 gauge galvanized steel with an internal baffle and external lintel baffle to inhibit air infiltration.

2.02 ELECTRICAL COMPONENTS

A. Electric operator shall be 2 to 3 horsepower, 208 volts, three-phase heavy duty motor with instant reverse ratchet and automatic reset thermal overload. Motor shall be sized by door supplier based on size and weight of door. Motor shall be totally enclosed non-ventilated or totally enclosed fan-cooled construction. Operator shall have a brake that is spring-set and solenoid released and able to stop and hold curtain in any position. Operator shall be equipped with a quick-release equipment for manual operation in case of emergency or power failure.

B. Provide interior mounted NEMA 4X-rated PVC pushbutton control station (open/close/stop) at each door.

C. Provide a built-in radio receiver as well as four remote control radio transmitters with open, close, and stop functions for each door operator.

D. Control system shall use a heavy-duty reversing contactor, electrically and mechanically interlocked. System shall accommodate connection of sensing edge and control stations. Electrical controls and devices shall be rated for a corrosive environment.

E. Each door with electric operator shall have electric sensing edge to stop and reverse the door upon contacting an object while closing. Sensing edges shall be powered from electric operator and monitored in accordance with UL 325:2010. Sensing edge shall be supplied with factory provided-cable at length as required for door installation.

F. Each door with electric operator shall have infrared optoelectronic sensors mounted maximum 6 inches above the floor to stop and reverse the door upon sensing an object while closing. Provide manufacturer's mounting adapters. Sensors shall be powered from the electric operator and monitored in accordance with UL 325:2010. Sensors shall have visible LEDs to indicated power and proper alignment and shall utilize self-adjusting light intensity. Sensors shall be constructed of polypropylene and rated NEMA 4X. Sensors shall be supplied with factory provided-cable at length as required for door installation. Sensors shall be tested with the electric operator to comply with UL 325:2010.

G. Operator, controls, and components listed in this specification for doors shall be NEMA 4X.

2.03 FINISH

A. The curtain and hood shall receive a UV-resistant powder-coat finish with color selected from manufacturer's standard colors. Color shall be selected by department.

B. All other ferrous surfaces, except galvanized surface and working parts of machinery, shall receive one coat of manufacturer's standard factory-applied rust-inhibitive primer. Primer shall be compatible with field-paint system. Those areas that will become inaccessible after installation shall be finish painted as specified in Section 09 91 00–Painting prior to installation. Finish paint all components not powder coated per Section 09 91 00–Painting.

PART 3–EXECUTION

3.01 INSTALLATION

A. Door shall be installed in accordance with the manufacturer's standards and instructions by an authorized representative.

B. Provide all required casing materials.

C. Upon completion of installation, operating devices and controls shall be adjusted and lubricated to operate properly.

3.02 SCHEDULE

A. See Door Schedule on the drawings.

END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Hardware to fully equip all doors.
   2. Thresholds and weatherstripping.

1.02 REGULATORY REQUIREMENTS

A. Hardware shall conform with barrier-free requirements.

1.03 SUBMITTALS

A. Submit shop drawings in accordance with Standard Specification Section 105 for all hardware and accessories.

PART 2–PRODUCTS

2.01 LOCKSETS AND LATCHSETS

A. Provide mortises and reinforced polymer blocking for all hardware.

B. Locksets and latchsets shall have 2 3/4-inch backset. Strikes shall be curved lip.

C. Lockset and latchset numbers listed in Paragraph 3.02 Schedule are Schlage.

D. Provide removable core brass 6- or 7-pin cylinders for all locksets and latchsets.

2.02 HINGES

A. Butt hinges shall be full mortise, ball bearing, nonferrous, nonrising, loose pin, and flat bottom tip, unless otherwise specified. Provide three 4 1/2-inch by 4 1/2-inch hinges per door for doors 7 feet or less in height with one additional hinge for each additional 30 inches or fraction thereof, unless otherwise specified. Provide additional hinges or heavyweight hinges for all doors that are over 36 inches wide, unless specified otherwise.

2.03 DOOR CLOSERS

A. Door closers shall be LCN Series 1460, Hager Series 5200, Norton 8501, or equal. Provide stainless steel finish on closers. Provide full covers. Door closers specified in paragraph 3.02 are LCN. (H-Hold Open).

2.04 KICK PLATES

A. Kick plates shall be 6 inches high. Kick plate width shall be 2 inches less than door width.

2.05 THRESHOLD AND WEATHERSTRIPPING

A. All exterior doors shall be weatherstripped with Reese DS75, National Guard Products, Inc. 156, or equal, weatherstripping. Provide Reese 323C, Pemko 315AN, or equal, sweeps; and Reese S425A, Pemko 171A, or equal, thresholds.

2.06 KEYING

A. Door locks for Salt Storage Building shall be keyed to match Outagamie County master. Provide two keys per lock. Doors shall have temporary construction cylinders. Provide permanent cylinders at project completion.

2.07 LATCH PROTECTION PLATE

A. Latch protection plate shall be 3 inches by 11 inches for use with cylindrical locksets with a 2 3/4-inch basket. Protection plate shall be stainless steel to match door hardware and be compatible with all door hardware selected.

2.08 ELECTRIC STRIKE

A. Electric strike shall be HES Series 1006 for standard cylindrical locks. Provide with 12-volt DC continuous operation.

2.09 FINISH

A. Finish for all hardware, except as noted below, shall be US 26D or US 32D where stainless steel (ss) hardware is specified in Paragraph 3.02.

B. Finish for kickplates shall be 32D.

C. Where stainless steel (ss) is specified, all hardware, including threshold and weatherstripping, shall be installed with stainless steel fasteners.

PART 3–EXECUTION

3.01 INSTALLATION

A. Provide finish hardware to fully equip all doors.

B. Install hardware in accordance with manufacturer's instructions.

3.02 SCHEDULE

A. Provide the following hardware group for each door shown on the plans:

Group 1

Lockset–CO-100 (ss)

Door Closer–1460 (ss) (H)

(Parallel Arm)

Hinges and Kickplate (ss)

Electric Strike

Threshold and Weatherstripping

Latch Protection Plate

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Surface preparation and application of paints and coatings.

1.02 REFERENCES

A. ASTM B117–Standard Practice for Operating Salt Spray (Fog) Apparatus.

B. ASTM D2247–Standard Practice for Testing Water Resistance of Coatings in 100 % Relative Humidity.

C. ASTM D3363–Standard Test Method for Film Hardness by Pencil Test.

D. ASTM D4060–Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.

E. ASTM D4541–Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.

F. ASTM D4585–Standard Practice for Testing Water Resistance of Coatings Using Controlled Condensation.

G. Federal Register–Code of Federal Regulations (CFR).

H. Federal Register–Resource Conservation and Recovery Act (RCRA).

I. Federal Register–Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

J. ICRI–International Concrete Repair Institute.

K. NACE–National Association of Corrosion Engineers.

L. SSPC–The Society for Protective Coatings–Steel Structures Painting Manual.

1.03 SUBMITTALS

A. Submittals shall be in accordance with provisions of Standard Specification Section 105.

B. Shop primer proposed for use shall be submitted with all material and equipment submittals. All shop primers shall be of the same generic type and quality as those specified herein.

C. Submit two copies of manufacturer’s Material Safety Data Sheets (MSDS) for each type of paint with each shop drawing submittal. MSDS sheets shall be posted at the construction site at all times painting is in progress.

D. Substitution submittals shall include performance test data, as certified by a qualified testing laboratory, for the ASTM tests specified in paragraph 2.01.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site in original containers with labels intact and seals unbroken.

B. Drop cloths shall be used in all areas where painting is done to fully protect other surfaces.

C. Oily rags and waste must be removed from the building each night or kept in an appropriate metal container.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Contractor shall dry-heat, dehumidify, and ventilate to obtain painting conditions recommended by the paint manufacturer during surface preparation, application, and cure.

B. Relative humidity conditions as specified by the paint manufacturer's data sheet shall be adhered to. This includes times in which supplemental heat is used. Supplemental heat shall be indirect-fired hot air furnaces or electric heat. Open-flame heaters shall not be used.

C. No unprotected, unheated exterior painting shall be undertaken when damp weather appears probable, nor when the temperature of the substrate is below 55°F, unless approval in writing is received from the paint manufacturer.

1.06 COLOR SELECTIONS

A. Provide color charts for all coatings being used on the project. After initial selection of colors by department, provide draw down samples of selected colors for department's final approval.

B. Contractor shall provide a summary sheet at the completion of the project listing the finish paint products used and the manufacturer's color identification for each item painted. This summary sheet should be submitted to engineer and department for review.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. All materials required for painting shall be types and quality as manufactured by Tnemec Company, Inc., Sherwin Williams Company, International Devoe, Carboline, or equal, unless noted otherwise in the schedule.

B. Where thinning is necessary, only the products of the manufacturer furnishing the paint will be allowed. All such thinning shall be done strictly in accordance with the manufacturer's instructions.

C. Paint and paint products of Tnemec Company and Sherwin Williams, listed in the following specifications, are set up as standard of quality. Carboline and PPG Protective and Marine Coatings have equivalent products.

PART 3–EXECUTION

3.01 SURFACE PREPARATION

A. General:
1. All surfaces to be painted shall be prepared as specified herein and by the manufacturer's published data sheet and label directions. The objective shall be to obtain a uniform, clean, and dry surface.
2. No field painting shall be done before the prepared surfaces are observed by engineer. Surfaces painted without such observation shall be abrasive-blast-cleaned and repainted.

B. Ferrous Metal:
1. All ferrous metal to be primed in the shop shall have all rust, dust, and mill scale, as well as all other foreign substances, removed by abrasive blasting. Cleaned metal shall be primed or pretreated immediately after cleaning to prevent new rusting.
2. All ferrous metals not primed in the shop shall be abrasive-blasted in the field prior to application of the primer, pretreatment, or paint.
3. Abrasive blasting of metals in the shop shall be in accordance with SSPC-SP6 Commercial Blast Cleaning.
4. Solvent cleaning in accordance with SSPC-SP1 shall precede all abrasive-blasting operations.
5. Prior to finish coating, all primed areas that are damaged shall be cleaned and spot-primed.

C. Concrete:
1. All concrete surfaces, including precast concrete to be painted, shall be cleaned of all form oil, curing compound, and other foreign matter.
2. All new precast concrete walls shall be abrasive-blast cleaned in accordance with SSPC-SP13/NACE No. 6 in order to prepare the surfaces for adherence of the painted systems specified.
3. Bug hole, pits, voids, and cracks shall be filled. The dried surface shall be stoned down.
4. Paint manufacturer shall approve the surface preparation method.
5. After cleaning, the surfaces shall be washed and all dust, sand, and loose particles shall be removed by vacuuming.

D. Galvanized: Where galvanized items are not submerged or buried, they shall be cleaned with nonhydrocarbon solvent cleaner (such as Clean N Etch, or equal) in accordance with SSPC-SP1 and shall be abrasive-blasted in accordance with SSPC-SP16 Brush-Off Blast Cleaning.

3.02 APPLICATION

A. All materials shall be used as specified by the manufacturer's published data sheets and label directions.

B. No paint shall be applied on a wet or damp surface and in no case until the preceding coat is dry and hard. Each coat shall be allowed to dry in accordance with manufacturer's data sheets before the next coat is applied.

C. Drying time shall be construed to mean "under normal conditions." Where conditions are other than normal because of the weather or because painting must be done in confined spaces, other drying times will be necessary.

D. Additional coats of paint shall not be applied, nor shall units be returned to service until paints are thoroughly dry and cured.

E. Steel that will be inaccessible in the completed work shall receive the final coat before enclosure.

F. Paint shall be applied to provide an opaque, smooth surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs,

sags, or other surface imperfections will not be acceptable. Tops and bottoms of walls and areas that are “cut-in” by brush prior to rolling shall have a uniform appearance in comparison with adjoining surfaces.

G. Crevices and other hard-to-apply areas shall be back-rolled/back-brushed in conjunction with application of the first field coat of primer or intermediate coat.

3.03 FIELD QUALITY CONTROL

A. Examination of work on the site by the manufacturer’s representative shall be performed when requested by engineer.

3.04 CLEANING

A. All stains and marks shall be removed from other surfaces upon completion of the work.

3.05 SCHEDULE

A. General:
   1. At the completion of the project, all painted surfaces which have been damaged shall be repainted or touched-up.
   2. See the drawings for an additional reference for areas to be painted.
   3. Products listed first are Tnemec and second are Sherwin Williams.

B. New Work:
   1. All new work done by all trades shall be painted by contractor in accordance with the following schedule and in accordance with paint manufacturer’s recommendation. It is the intent of these specifications that all non-galvanized ferrous metal items scheduled for painting be shop-primed. If items are not shop-coated, surfaces shall be prepared and painted in the field as specified. If any items of new construction are not listed, contractor shall request paint system from engineer, and the items shall be painted as part of this Contract without additional cost.
   2. Interior Concrete Walls:
      a. One filler coat (1/16-inch minimum thickness) Mortarclad 218, Duraplate 2300.
      b. Two coats of Series N69 Hi-Build Epoxoline II, Macropoxy 646 Fast Cure.
   3. Steel:
      a. One shop coat of N69-1255 Hi-Build Epoxoline, Macropoxy 646 Beige as primer.
      b. Touch-up primer prior to finish coat, and either:
         (1) Two coats of N69 Hi-Build Epoxoline II, Macropoxy 646 for interior surfaces; or
         (2) One coat of N69 Hi-Build Epoxoline II, Macropoxy 646; and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.
         (3) First field coat shall be applied prior to installation to surfaces inaccessible after installation including back sides of door frames.
   4. Galvanized; not submerged or buried:
      a. One coat of N69-1255 Hi-Build Epoxoline II, Macropoxy 646, and either:
      b. Two coats of N69 Hi-Build Epoxoline, Macropoxy 646 for interior surfaces, or
      c. One coat of N69 Hi-Build Epoxoline, Macropoxy 646, and one coat of 1074 Endura-Shield, Acrolon 218HS for exterior surfaces.

C. Coverage:
   1. Dry mil thickness shall conform to those specified. Mil test measurement shall conform to SSPC Steel Structures Painting Manual. Dry Film Thickness (DFT) shall be verified in accordance with SSPC-PA2.
   2. The coatings listed will provide the mil thickness given when applied at the coverages listed. Upon the request of engineer, such surfaces shall be checked by the painter with a calibrated mil thickness gauge and any

deficiencies found in the film shall be remedied by additional coat(s) at the expense of contractor.

3. On porous surfaces, it shall be the painter's responsibility to achieve a protective and decorative pinhole-free finish either by decreasing the coverage rate or by applying additional coats of paint.
4. Coverages reflect manufacturer's recommendations using spray application techniques. Where brushing or rolling is specified or performed at the discretion of the painter, one additional coat, minimum, will be required to achieve total DFT thickness as specified and recommended by the manufacturer.

	Sq. Ft. Coverage **	Dry Mil Thickness Per Coat **
N69 Hi-Build Epoxoline II, Macropoxy 646		
Steel or Impervious Substrate Primer Coat	---	4.0
Steel or Impervious Substrate Intermediate Coat	---	5.0
Steel or Impervious Substrate Finish Coat	---	5.0
1074 Endura-Shield II, Acrolon 218HS	---	2.5
N69 Hi-Build Epoxoline, Macropoxy 646 (Concrete)	250	---

** Roller or brush application requires two or more coats to obtain recommended film thickness. No allowance is made for overspray, waste in handling, mixing, or application. Final total DFT shall be equal to that specified. Paint submittals shall note where roller or brush application is proposed and the paint manufacturer's recommendations or number of coats to achieve the required thickness shall be noted. Primer, intermediate, and/or final surface colors shall be of contrasting colors to promote coverage.

D. Colors: Colors are to be selected by department to match factory-finished items.

END OF SECTION

SECTION 10 44 43
FIRE EXTINGUISHERS AND ACCESSORIES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Fire extinguishers.
   2. Accessories.

1.02 REFERENCES

A. ANSI/NFPA 10–Portable Fire Extinguishers.

1.03 SUBMITTALS

A. Submit under provisions of Standard Specification Section 105.

B. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.

1.04 QUALITY ASSURANCE

A. Provide units conforming to NFPA 10 requirements for portable fire extinguishers.

B. Provide fire extinguisher, brackets, and accessories by single manufacturer.

PART 2–PRODUCTS

2.01 EXTINGUISHERS

A. Provide two dry-chemical-type, 10-pound-capacity fire extinguishers at locations shown on plans. Fire extinguishers shall be UL-approved for Class A, Class B, and Class C fires.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Place extinguishers in brackets where shown on the drawings.

C. Mount fire extinguisher so the handle is at 48 inches above the finished floor.

END OF SECTION

SECTION 26 05 00
GENERAL ELECTRICAL REQUIREMENTS

PART 1–GENERAL

1.01 SUMMARY

A. Work includes general requirements for all electrical work.

1.02 REFERENCES

A. ANSI/NFPA 70–National Electrical Code (NEC).

B. ANSI/IEEE C2–National Electrical Safety Code.

1.03 CONTRACT DOCUMENTS

A. Any equipment roughed in improperly and/or not positioned on implied centerlines or as dictated by good practice shall be repositioned at no cost to department.

B. The Drawings are generally diagrammatic, and contractor shall coordinate the Work so that interferences are avoided. Provide all offsets in conduit, fittings, etc., necessary to properly install the work. All offsets, fittings, etc., shall be provided without additional expense to department.

1.04 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 70.

B. Conform to ANSI/IEEE C2.

C. The rules and regulations of the federal, state, local, and civil authorities and utility companies in force at the time of execution of the Contract shall become a part of this specification.

D. Obtain electrical permits and inspections from authority having jurisdiction. Costs for permits and inspections shall be paid by contractor.

1.05 CODES AND ORDINANCES

A. Contractor is expected to know or to ascertain, in general and in detail, the requirements of all codes and ordinances applicable to the construction and operation of systems covered by this Contract. Contractor shall know or ascertain the rulings and interpretations of code requirements being made by all authorities having jurisdiction over the work to be performed by them.

B. In preparing a Bid, contractor shall include the cost of all items and procedures necessary to satisfy the requirements of all applicable codes, ordinances, and authorities, whether or not these are specifically covered by the Drawings and Specifications. All cases of apparent conflicts between the Drawings, Specifications, and codes shall be brought to engineer’s attention, as herein before specified. Contractor shall carry out work and complete construction as required by applicable codes and ordinances and in such a manner as to obtain approval of all authorities whose approval is required.

C. When requested by engineer, contractor shall provide written calculations to show compliance with applicable codes or the Contract Documents. This shall include, but not be limited to, conduit and wire sizing, junction and pull box fill and sizing, conductor derating, and voltage drop. Contractor shall indicate calculation method used as well as compliance with applicable code, drawing, or specification.

1.06 EQUIPMENT PROVIDED UNDER OTHER DIVISIONS

A. Included in this Contract are electrical connections to equipment provided under other divisions. Contractor shall refer to final shop drawings for equipment being furnished under other divisions, for exact location of electrical equipment, and the various connections required.

1.07 ELECTRICAL DISTRIBUTION SYSTEM

A. Provide a complete electrical distribution system consisting of components indicated on the Drawings or specified herein including, but not limited to:
   1. All miscellaneous equipment coordination and related appurtenances required by power company.
   2. 208-volt, three-phase, 4-wire service entrance conductors.
   3. Feeders, branch wiring, and electrical distribution equipment.
   4. All control wiring.
   5. Wiring between system components if equipment is not prewired.
   6. Lighting fixtures, lighting controls, and associated wiring.
   7. Support system design and supports for electrical raceways.
   8. Code-required disconnects.

B. Contractor shall connect all equipment furnished by other Divisions consisting of components indicated on the Drawings or specified herein.

C. Provide balancing and adjusting of electrical loads.

D. Contractor shall instruct department's representative in the operation and maintenance of all equipment. The instruction shall include a complete operating cycle on all apparatus.

E. Provide miscellaneous items for a complete and functioning system as indicated on the Drawings and specified herein.

F. A partial list of work not included in Division 26 is as follows: Painting (except as otherwise specified herein).

1.08 NOISE

A. Eliminate any abnormal noises that are not considered by engineer to be an inherent part of the systems as designed. Abnormal buzzing in equipment components will not be acceptable.

1.09 DRAWINGS

A. The Drawings indicate approximate locations of the various items of the electrical systems. These items are shown approximately to scale and attempt to show how these items should be integrated with building construction. Locate all the various items by on-the-job measurements in conformance with Contract Documents and cooperation with other trades.

B. Prior to locating equipment, confer with engineer as to desired location in the various areas. In no case should equipment locations be determined by scaling drawings. Relocate equipment and bear cost of redoing work or other trades' work necessitated by failure to comply with this requirement.

C. In certain instances, receptacles, switches, light fixtures, or other electrical devices and equipment, etc., may be relocated. Where relocation is within 10 feet of location shown on the Drawings, and when contractor is informed of necessary relocation before work is begun on this portion of the job, the relocation shall be at contractor's expense.

D. The Drawings are schematic in nature and are not intended to show exact locations of conduit, but rather to indicate distribution, circuitry, and control.

1.10 EXISTING UNDERGROUND UTILITIES

A. The Drawings show approximate location of existing underground utilities based on department-provided record drawings. Contractor shall excavate and verify the location of all underground utilities prior to installing new electrical equipment and prior to making modifications to existing electrical. This shall include, but not be limited to, feeders to structures and equipment, branch circuit wiring, phone and communication cabling, instrument wiring, and control wiring. Contractor shall temporarily relocate existing underground utilities to keep the existing facility in operation and for any new construction, and all costs for relocating existing electrical shall be included in the Bid.

1.11 SUBMITTALS

A. Contractor shall submit to engineer for approval prior to beginning work, shop drawings on the equipment and materials proposed to be furnished and installed. See Standard Specification Section 105 for requirements.

B. Contractor shall, in addition, submit drawings and/or diagrams for review and for job coordination in all cases where deviation from the Contract Drawings are contemplated because of job conditions, interference or substitution of equipment, or when requested by engineer for purposes of clarification of contractor's intent. Contractor shall also submit detailed drawings, rough-in sheets, etc., for all special or custom-built items or equipment. Drawings and details under this section shall include, but not be limited to, the following, where applicable to this project: Major feeder routing in plan and elevation, including service entrance raceways and cable.

C. These drawings and diagrams shall show applicable electrical switch and breaker sizes as well as the manufacturer's name and catalog number for each piece of equipment used.

D. Equipment and material submittals must show sufficient data to indicate complete compliance with Contract Documents as follows:
   1. Proper sizes and capacities.
   2. That the item will fit in the available space in the manner that will allow proper service.
   3. Construction materials and finishes.

E. When the manufacturer's reference numbers are different from those specified, provide correct cross-reference number for each item. The shop drawings shall be clearly marked and noted accordingly.

F. When equipment and items specified include accessories, parts, and additional items under one designation, shop drawings shall be complete and include all components.

PART 2–PRODUCTS

2.01 STANDARD PRODUCTS

A. All equipment and products shall be of new manufacture per applicable specifications.

B. All equipment shall be UL or NRTL listed and NEMA approved.

C. All equipment and wiring shall be selected and installed for conditions in which it will perform (e.g., general purpose, weatherproof, raintight, dustproof, or any other special type).

2.02 SUBSTITUTION OF MATERIALS AND EQUIPMENT

A. While it is not the intention of department to discriminate against any manufacturer of equipment which may be equivalent to specified equipment, a strict interpretation of such equivalency will be exercised in considering any equipment offered as a substitute for specified equipment. Refer to Standard Specification Section 106 Control of Materials for product substitution procedures. In addition to the Standard Specification requirements, contractor shall submit with each request for approval of substitute material or equipment sufficient data to show conclusively that it is equivalent to that specified in the following respects:
   1. Performance:
      a. Capacity at conditions and operating speeds scheduled shall be equal to or greater than that of the specified equipment.
      b. Energy consumption at the point of rating shall not exceed that of the specified equipment.
      c. Vibration and noise production at the point of rating shall not exceed that of the specified equipment.
   2. Materials of construction.
   3. Gauges, weights, and sizes of all portions and component parts.
   4. Design arrangements, methods of construction, and workmanship.
   5. Coatings, finishes, and durability of wearing parts.
   6. National reputation of the manufacturer as a producer of first quality equipment of the type under consideration.
   7. Availability of prompt, reliable, and efficient service facilities franchised by or affiliated with the equipment manufacturer. This shall include the maintenance of local stocks of critical replacement parts equal to those maintained for the specified equipment.

B. Requests for substitution shall include contractor’s reason for the request.

C. If engineer does not consider the items equivalent to those specified, contractor shall provide those specified.

2.03 LOW VOLTAGE WIRING (LESS THAN 100 VOLTS)

A. Low-voltage wiring specified in this section shall be applicable to all systems installed that utilize low-voltage wiring where such wiring is not specified in other technical sections.

B. All wiring shall have copper conductors with 300-volt insulation rating and meet the requirements of NEC Article 725.

C. All conductors must be suitable for the application intended. Conductors 16 AWG and larger shall be stranded. Conductors 18 AWG and smaller may be solid or stranded.

D. Control Cable for Class 1 Remote Control and Signal Circuits: Individual conductors twisted together, shielded, and covered with an overall PVC jacket. Cable shall be UL listed, temperature rated, and plenum or nonplenum rated for the application as required in the National Electrical Code.

E. Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits shall be constructed, UL listed, temperature rated, and plenum or nonplenum rated for the application as required in the NEC Article 725.

PART 3–EXECUTION

3.01 UTILITY SERVICES

A. Utility connection requirements shall be determined. All costs for coordinating utility service shall be included in the price bid as described in Section 26 21 00–Electrical Service System of these specifications.

B. All costs for temporary service, temporary routing of piping, or any other requirements of a temporary nature associated with the utility service shall be included in the Base Bid.

C. It is the intent that in the latter stages of construction, the permanent electrical service will be used and the temporary construction service discontinued. The following requirements shall govern the use of the permanent services:
   1. No permanent service shall be available until structure is enclosed, watertight, and heated.
   2. Only permanently connected and protected circuits and outlets shall be available.
   3. Temporary wiring shall not be connected to permanent distribution equipment.
   4. Under the above conditions, the use of permanent service equipment shall in no way affect the Contract conditions of the guarantee.

D. It shall be contractor’s responsibility to police this situation and protect its equipment.

3.02 CONTINUITY OF SERVICE

A. Contractor shall provide and maintain continuous services (power, controls, alarms, etc.) during the entire construction period.

B. No service shall be interrupted or changed without permission from department. Written permission shall be obtained before any work is started.

C. When interruption of service is required, all persons concerned shall be notified and a prearranged time agreed upon. Notice shall be a minimum of 72 hours prior to the interruption.

3.03 CLEANUP AND REMOVAL OF RUBBISH

A. All lighting and appliance panelboards and disconnect switch enclosures, junction boxes, and pullboxes shall be cleaned of debris and wires neatly arranged with surplus length cut off before installation of covers.

B. Where air filters are provided in equipment such as control panels, contractor shall replace all filters with new at the time of final completion.

C. All lighting fixture lenses (interior and exterior fixtures) shall be cleaned at the time of installation, and all lens exteriors shall be cleaned just prior to final inspection.

D. Equipment shall be thoroughly cleaned of all stains, paint spots, dirt, and dust. All temporary labels not used for instruction or operation shall be removed.

3.04 CONCRETE WORK

A. Provide all anchor bolts, metal shapes, and templates to be cast in concrete or used to form concrete for support of electrical equipment.

3.05 PAINTING

A. All painting of electrical equipment shall be done by contractor unless equipment is specified to be furnished with factory-applied finish coats.

B. All electrical equipment shall be provided with factory-applied prime finish, unless otherwise specified.

C. If the factory finish on any equipment furnished by contractor is damaged in shipment or during construction, the equipment shall be refinished by contractor.

D. One can of touch-up paint shall be provided for each different color factory finish which is to be the final finished surface of the product.

3.06 CAULKING

A. Caulk with a caulking sealant where indicated on the electrical drawings or hereinafter specified.

B. Caulking sealant shall be silicone construction sealant or two-part polysulfide conforming to the requirements and bearing the seal of the Thiokol Chemical Corporation.

C. Caulking sealant shall contain no acid or ingredients that will stain stone, corrode metal, or have injurious effect on painting. It shall be colored to match adjacent surroundings.

3.07 BUILDING ACCESS

A. Contractor shall arrange for the necessary openings in the building to allow for admittance of all apparatus.

B. When the installation requires openings and access through existing construction and the openings are not provided, contractor shall provide the necessary openings.

3.08 COORDINATION

A. Provide wiring for all motors and all electrically powered or electrically controlled equipment.

B. All disconnects, wire, conduit, and other devices for the power and control of motors or electrical equipment shall be provided by contractor except as specifically noted elsewhere in these specifications or on the Drawings.

C. Where devices are provided by others, they shall be connected and wired by contractor.

D. Contractor’s drawings and specifications shall show number and horsepower rating of all motors furnished, together with their actuating devices. Should any change in size, horsepower rating, or means of control be made to any motor or other electrical equipment after the Contract is awarded, any additional costs because of these changes shall be the responsibility of contractor.

E. All motors shall be provided for starting in accordance with local utility requirements.

F. Contractor shall provide all power and control wiring for operation, control, and supervision of all equipment as specified herein and as shown on the Drawings.

G. Contractor shall connect and wire all apparatus according to approved wiring diagrams furnished by the various trades.

H. Motors 1/2 hp and larger shall be NEMA rated 208 volts, three-phase, 60 Hz, unless otherwise shown. Motors 1/3 hp and below shall be 115 volts, single-phase, 60 Hz, unless otherwise shown.

3.09 EXCAVATION AND BACKFILL

A. Backfilling of all trenches within building footprint shall be accomplished with gravel fill and shall be specially compacted to same density as surrounding area. Backfill of exterior trenches shall be compacted granular fill meeting Standard Specification Section 209, unless otherwise noted. Compaction shall meet the requirements of Standard Specification Section 301. Refer to Section 26 05 33–Conduit for additional requirements associated with PVC conduit installed in earth.

B. Lines passing under foundation walls shall have a minimum of 1 1/2-inch clearance.

C. Care shall be taken so that there is no disturbance of bearing soil under foundations.

3.10 EQUIPMENT ACCESS AND LOCATION

A. Contractor shall coordinate work of this division with that of other divisions so that all systems, equipment, and other components of the building will be installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. This means adequate access to all equipment not just that installed under this division. Any components for the electrical systems that are installed without regard to the above shall be removed and relocated as required to provide adequate access at contractor's expense.

B. Where various items of equipment and materials are specified and scheduled, the purpose is to define the general type and quality level, not to set forth the exact trim to fit the various types of ceiling, wall, or floor finishes. Provide materials that will fit properly the types of finishes actually installed.

C. All equipment, junction and pull boxes, and accessories shall be installed to permit access to equipment for maintenance. Any relocation of conduits, equipment, or accessories to provide maintenance access shall be accomplished by contractor at no additional cost.

D. Electrical equipment, devices, hardware, etc., shall be installed with ample space allowed for removal, repair, calibration or changes to the equipment. Ready accessibility to equipment and wiring shall be provided without moving other equipment that is to be installed or that is already in place.

E. Locate electrical outlets and equipment to fit the details, panels, decorating, or finish of the space. Engineer shall reserve the right to make minor position changes of the outlets before the work has been installed. Verify door swings before installing room lighting switch boxes, and install boxes on the latch side of door unless noted otherwise.

3.11 WORKMANSHIP

A. All work shall be performed in compliance with the NEC.

B. Install work using procedures defined in NECA Standard of Installation.

C. Utilization equipment and control devices required under these specifications shall be mounted in a code-approved manner.

D. Locations of utilization equipment and control devices as shown on the Drawings are within 10 feet of actual positions. Any mounting of this equipment within this 10-foot distance shall be performed at no additional cost to department.

E. Unless otherwise noted, conduit shall be fastened to building structure or equipment framework and not placed on the floor.

F. Where materials, equipment apparatus, or other products are specified by manufacturer, brand name, and type or catalog number, such designation is to establish standards of desired quality and style and shall be the basis of the Bid.

G. Materials and equipment of the types for which there are National Board of Fire Underwriters Laboratories (UL) or other NRTL listings shall be so labeled and shall be used by contractor.

3.12 MODIFICATIONS TO EXISTING CONSTRUCTION

A. Alterations:
   1. Alter, extend, and reconnect conduits as necessary.
   2. Reconnect existing conduits that were reused, cut, or exposed because of construction as quickly as possible.
   3. Where wiring is involved, new wires shall be “pulled in” between the nearest available accessible reused outlets to the extent allowed by the governing code.
   4. Provide new conduits for wires if they cannot be “pulled in” to existing conduits.
   5. All new conduits, wiring, and electrical items shall be connected to the existing systems so as to function as a complete unit.
   6. Where existing electrical equipment, devices, fixtures, electrically operated items, etc., interfere with any remodeling work, they shall be removed and reinstalled in another location to avoid such interferences. All existing and relocated equipment shall be left in good operating condition.

END OF SECTION

SECTION 26 05 19

WIRE

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Wire.
   2. Wiring connections and terminations.

1.02 QUALITY ASSURANCE

A. Manufacturers of Wire: Firms regularly engaged in the manufacture of electrical wire products of the types and ratings needed whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL or NRTL Labels: Provide electrical material, which has been listed and labeled by Underwriters Laboratories or other NRTL.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.03 SUBMITTALS

A. Submit shop drawings and product data under the provisions of Standard Specification Section 105.

B. Submit shop drawings for wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.

C. Submit manufacturer's instructions.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Provide factory-wrapped, waterproof, flexible-barrier material for covering wire on wood reels, where applicable, and weather-resistant fiberboard containers for factory-packaging of wire, connectors, outlets, boxes, etc., to protect against physical damage in transit. Do not install damaged wire or other material; remove from project site.

B. Store wire and other material in factory-installed coverings in a clean, dry, indoor space which provides protection against the weather.

PART 2–PRODUCTS

2.01 WIRE

A. All wire for permanent installation shall be new stranded copper delivered to project in unopened cartons or reels, except where specifically noted and be UL listed for the use intended. No wire smaller than 12 AWG shall be used unless specifically noted.

B. Motor circuit branch wiring and associated control wiring shall be minimum size 14 AWG.

C. Wiring in all locations shall be XHHW-2.

D. Refer to Section 26 05 53–Electrical Identification for required wire insulation color coding and conductor labeling requirements. Initial phase color shall be used throughout the run, even for switch legs. Colors must meet code requirements for each class voltage. Do not duplicate colors, including neutral, on different voltages.

E. Branch circuit wiring for exterior lights in excess of 75 feet shall be minimum 10 AWG. Circuits 150 feet or over shall be sized for a maximum 2% voltage drop.

2.02 WIRING CONNECTIONS AND TERMINATIONS

A. Provide crimp type UL or ETL listed terminations for 6 AWG and smaller stranded conductor connections to electrical devices and equipment such as receptacles, switches, and terminal strips.

B. Provide insulated, silicone-filled spring wire connectors with plastic caps for 8 AWG conductors and smaller. Spring wire connectors shall only be allowed in junction, outlet, or switch boxes. Spring wire connectors are not allowed for terminating motor conductors.

C. All feeder cable connections to motor leads up to 600 volts shall be insulated and sealed with factory-engineered kits. Motor connection kits shall consist of split-bolt connector for 8 AWG and smaller, and motor-lead pigtail splice kit. Individual components shall be as follows:
   1. Split-bolt connectors shall be for use with copper conductors only.
   2. Pigtail splice kit shall consist of one-hole lug cover, silicone grease, and mastic sealing strip. Kit shall be selected based on motor, feeder, and lug sizes installed.

D. No splices will be allowed unless reviewed by engineer.

PART 3–EXECUTION

3.01 GENERAL WIRING METHODS

A. Install electrical wire and connectors in accordance with the manufacturer’s written instructions, applicable requirements of the NEC, the National Electrical Contractors Association’s “Standard of Installation,” and in accordance with recognized industry practices so that products serve the intended functions. Use appropriate wiring methods and materials for the equipment or environment.

B. Stranded conductors shall be terminated using crimp-type devices specified herein. Conductors may not be wrapped around a terminal screw.

C. Place an equal number of conductors for each phase of a circuit in the same raceway.

D. Torque conductor connections and terminations with calibrated torque wrench to manufacturer’s recommended values. Provide permanent marking on lug, bolt, nut, or connection for conductors larger than 4 AWG.

E. Splice only in junction or outlet boxes. Splicing is not allowed in disconnects, underground pull boxes, panelboards, control panels, equipment, etc., unless noted otherwise. Avoid splices between terminals of interconnecting power and control wiring.

F. Spring wire connectors shall only be used in junction, outlet, or switch boxes. Equipment wireways (e.g., panelboards, disconnects, etc.), and control panels shall not have any spring-wire connectors installed, unless noted otherwise; all terminations shall be on terminal strips.

G. Neatly train, lace, and tie wrap all wiring inside boxes, equipment, control panels, and panelboards.

H. Make conductor lengths for parallel circuits equal.

I. The same color shall be used for each numbered wire throughout its entire length.

J. Terminate all wiring on terminal blocks in control panels and similar equipment. This shall include all spare or unused wires.

K. Provide a dedicated neutral for each branch circuit or feeder requiring a neutral. Ampacity of neutral conductor shall match that of the branch circuit or feeder.

L. Do not use a pulling means that can damage the raceway.

M. Signal wiring (below 100 volts) must be in a conduit separate from power and/or control wiring (over 100 volts). Signal wire shall include, but not be limited to, data communications and communication wiring (i.e., Ethernet, etc.).

N. Provide junction or pull boxes to facilitate the “pulling in” of wires or to make necessary connections. All raceways and apparatus shall be thoroughly blown out and cleaned of foreign matter prior to pulling in wires.

O. Thoroughly clean wires before installing lugs and connectors.

P. Make splices, taps, and terminations to carry full capacity of conductors without perceptible temperature rise.

Q. Spare wiring shall be terminated with electrical tape and labeled as “SPARE.” All spare conductor labels shall indicate where the conductors terminate. Refer to Section 26 05 53–Electrical Identification, for additional requirements.

R. Feeder connections to motors shall be installed within the motor junction box utilizing factory engineered kits as specified herein. Spring wire connectors are not allowed for connections to motors.

3.02 GENERAL LOW VOLTAGE WIRING METHODS (LESS THAN 100 VOLTS)

A. Low-voltage wiring installation requirements specified herein shall be applicable to all systems installed that utilize low-voltage wiring where such wiring installation is not specified in other technical sections.

B. Low-voltage wiring shall be installed in conduit.

C. Do not use wire smaller than 14 AWG for control wiring greater than 60 volts, or 18 AWG for voltages less than 60 volts. All sizes subject to NEC 725 requirements.

D. Low-voltage cable splices shall only be allowed in junction boxes.

3.03 WIRING INSTALLATION IN RACEWAYS

A. Pull all conductors into a raceway at the same time. Use UL-listed wire-pulling lubricant for pulling 4 AWG and larger wires. Wax-based pulling lubricant is not allowed unless it includes a Teflon additive.

B. Install wire in raceway after interior of building is enclosed, watertight, and dry, and all mechanical work likely to injure conductors has been completed.

C. Completely and thoroughly swab raceway system before installing conductors.

D. Conductors No. 6 AWG and larger shall be pulled into conduits by hand or by utilizing a tugger with built-in tension meter. Other motorized machines of any type are not allowed for any wire pulling. Contractor shall provide a report to engineer for each pull indicating maximum tension reached during the pull along with manufacturer's maximum pulling tension.

E. Conductors shall be installed in conduit system in such a manner that insulation is not damaged, conductors are not overstressed in pulling, and walls are not damaged. No splices are permitted except in junction boxes or outlet boxes.

F. Contractor shall observe code limitation on the number and size of wires in an outlet box. Contractor shall either lay out work so that the wires do not exceed the particular box limitation or provide larger boxes approved for additional capacity.

G. Panel riser feeder conductors shall be identified at panel lugs. The same phase relation shall be maintained throughout.

H. Circuiting is indicated diagrammatically on the Drawings.

3.04 TERMINAL BLOCK INSTALLATION

A. A maximum of one conductor shall be installed on the field-wired side of each terminal block. If rated to accept more than one conductor, a maximum of two conductors shall be installed on the enclosure-wired side of each terminal block. Provide additional terminal blocks and shorting jumpers as required.

3.05 FIELD QUALITY CONTROL

A. Inspect wire for physical damage and proper connection.

B. Prior to energizing, check conduit, raceways, outlet boxes, and wire for continuity of circuitry and for short circuits. Correct malfunction when detected.

C. Subsequent to wire hookups, energize circuitry and demonstrate functionality in accordance with these specifications.

D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.

E. Perform field inspection and testing according to provisions of this section.

3.06 ACCEPTANCE TESTS

A. Contractor shall furnish all materials, labor, and equipment necessary for the acceptance tests specified herein. Acceptance tests shall be performed in the presence of department or department's representative and must be passed before final acceptance of the work.

B. Contractor shall be responsible for powered tests of each field-installed device unless specifically noted otherwise. Contractor shall be responsible for device operation as powered from its power source.

C. Operation Test: By operational testing, department will give final acceptance of the wiring system when all of the wiring is considered a complete system. All equipment shall function and operate in the proper manner as indicated in the details of the specifications and on the Drawings. All motors shall be properly connected to protective devices, and motor rotation shall be in the correct direction.

D. At the request of department's representative, demonstrate by test the compliance of the installation with these specifications and Drawings, the National Electrical Code, and the accepted standards of good workmanship. These tests shall include operation of equipment, continuity of the conduit system, grounding resistance and insulation resistance.

E. A written record of performance tests on electrical and control systems and equipment shall be supplied to department. Such tests shall show compliance with governing codes.

F. The feeders and subfeeds to the lighting panels shall be completely phased out as to sequence and rotation. Phase sequence shall be A-B-C as follows:
   1. Front-to-rear, top-to-bottom, or left-to-right when facing equipment.
   2. Phasing shall be accomplished by using distinctive colors for the various phases. The same color or variation of it shall be used for a particular phase throughout the building and project.

3.07 WIRE INSTALLATION SCHEDULE

A. Install all wiring in raceways except as otherwise noted. This includes all low-voltage wiring such as access control, network, etc.

END OF SECTION

SECTION 26 05 26

SECONDARY GROUNDING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Power system grounding.
   2. Electrical equipment and raceway grounding and bonding.

1.02 SUBMITTALS

A. Indicate location of system grounding electrode connections and routing of grounding electrode conductor.

B. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

PART 2–PRODUCTS

2.01 MATERIALS

A. Ground Rods: Copper-bonded, 5/8-inch diameter; minimum length 10 feet.

B. Ground Connections Below Grade: Exothermic type by Cadweld or Harger Ultraweld, compression type by ABB (Thomas & Betts), or equal. Compression connectors shall be prefilled with an oxide inhibitor.

C. MECHANICAL CONNECTORS
   1. The mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers, and lock washers shall be made of Silicon Bronze and supplied as a part of the connector body.
   2. Split bolt connector types are not allowed.
   3. The connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size and manufacturer.

PART 3–EXECUTION

3.01 INSTALLATION

A. Compression-type connectors shall be installed with the manufacturer recommended tools. Compression dies shall emboss an index on the connector when installed correctly. An indenter crimp shall be made on ground rods prior to connection of grounding conductor.

B. Provide a separate insulated equipment grounding conductor for each feeder and branch circuit. Terminate each end on a grounding lug, bus, or bushing.

C. Bond together system neutrals, service equipment enclosures, exposed noncurrent carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, and receptacle ground connectors.

D. Connect grounding electrode conductors to metal frame of building or structure and structural reinforcing bars using suitable ground clamps.

E. Ground system and equipment as required by code and local ordinances.

F. All bare copper conductors installed outdoors shall be buried a minimum of 2 feet below grade.

G. A minimum of three ground rods at 15-foot separations near service entrance of each building shall be provided. These shall be connected to ground bus by conductors sized to code requirements. The above are minimum requirements.

H. Bends in grounding electrode conductors shall not exceed 90 degrees and shall have a minimum 8-inch bend radius.

I. Grounding electrode conductor terminations on ground rods shall be made at a minimum depth of 2 feet below grade.

J. Ground rods shall be installed a minimum of 2 feet horizontally from any below-grade footing or wall.

K. All grounding electrode conductors shall be installed in PVC conduit. All conduit bends shall be made using sweep elbows. Conduit bodies and 90-degree bends are not allowed.

L. Include ground for grounded receptacles, light fixtures, motors, network and access control system, and equipment items shown on the Drawings.

M. Flexible connections do not qualify for ground. All flexible connections must have separate green ground wire from motor base, lighting fixture, or equipment frame to conduit system.

N. Provide a separate grounding conductor system for the grounding of all lighting fixtures and devices installed in the same conduit as the branch circuit conductors. Ground conductors shall be individually connected at each fixture or device.

O. All equipment in areas that are fed from circuits in PVC conduit shall be provided with a separate green ground wire that is terminated at the metallic conduit system and the equipment.

P. Refer to Section 26 05 23–Instrument and Communication Wire and Cable for additional grounding requirements.

Q. Exposed exterior terminations of grounding electrode conductors shall be completely sealed with the same anti-corrosion joint compound specified in Section 26 05 33–Conduit to be used on conduit threads.

3.02 TESTING

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. Provide ground system resistance test report for each ground grid. Test reports shall document ground system resistance following the three-point “Fall-of-Potential” test. The test results shall include a graph of the results plus a diagram of the testing layout. The remote current probe (C2) shall be placed a minimum of 100 feet from the ground system potential/current probe (P1/C1) or as required to provide sufficient spacing to demonstrate a resistance plateau on the graph. The ground resistance shall be tested with the potential probe (P2) between the P1/C1 probe and the C2 probe at 10% intervals starting at 0% and ending at 100% of the distance between P1/C1 and C2, 11 points total. A single point of measurement is not acceptable, and the two-point method of ground system testing shall only be used where there is no or insufficient “open earth” area to use the three-point Fall-of-Potential method. Resistance at any point in the grounding system shall not exceed 5 ohms. All ground system tests shall be witnessed by engineer or department. Engineer shall be notified a minimum of 72 hours in advance of all ground system testing.

C. The test meter shall be Associated Research Vibroground test set with null balance, or equal. All ground system tests shall be performed in accordance with the procedures outlined in the instruction manuals of the ground system test equipment.

D. Ground resistance testing shall be performed with all rods connected and shall be isolated from all metallic connections, such as from the ground rod to other grounded structures and electrical system neutrals.

E. Multiple ground rod grids shall be isolated from all metallic connections such as from grid under test to other grounded structures and electrical system neutrals.

F. Provide test report using the attached Form 26 05 26. Each ground grid shall have a form submitted.

END OF SECTION

FORM 26 05 26

GROUND ROD RESISTANCE TO EARTH TEST RECORD

1. DATE _____

2. PROJECT NAME _____

3. LOCATION OF TEST _____

4. GROUND ROD TYPE _____

   DIAMETER _____ LENGTH _____

5. TEST METHOD _____

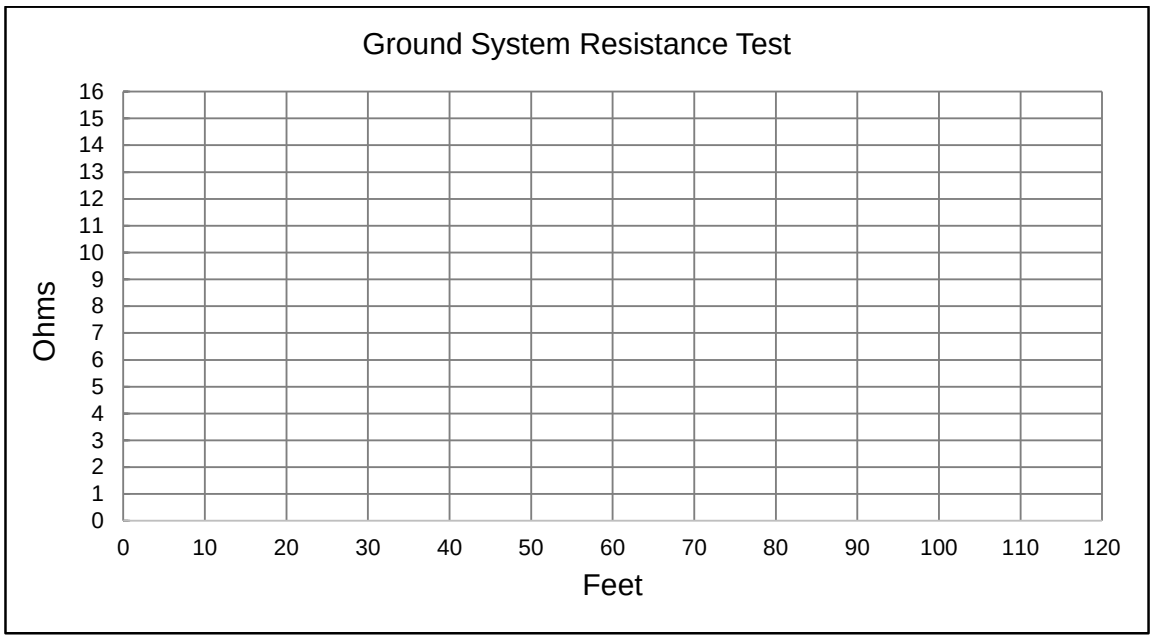
   INSTRUMENT TYPE _____

   SERIAL NO. _____

6. REQUIRED MAXIMUM RESISTANCE TO EARTH _____

7. MEASURED RESISTANCE TO EARTH

   GROUND ROD SYSTEM _____



TEST PERFORMED BY: _____
Signature

TEST WITNESSED BY: _____
Signature

SECTION 26 05 29

SUPPORTING DEVICES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Conduit and equipment support members.
   2. Fastening hardware.

1.02 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

PART 2–PRODUCTS

2.01 MATERIAL

A. Support members shall be 316 stainless steel, except hot-dipped galvanized steel shall be allowed where used with rigid galvanized steel conduit.

B. Hardware:
   1. 316 stainless steel, unless noted otherwise.
   2. PVC-coated steel clamps and stainless steel hardware with 316 stainless steel members shall be used where used to support PVC-coated rigid steel conduits.
   3. Hot-dipped galvanized steel shall be allowed where used with rigid galvanized steel conduit.

C. Manufacturers: Unistrut P-1000, B-line, Superstrut, or equal.

PART 3–EXECUTION

3.01 INSTALLATION

A. All supporting devices and support structures shall be constructed such that the structure adequately supports the load of the equipment installed on it including any wind and/or snow loads. Provide additional support members to those shown on the Drawings to adequately support load.

B. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors or support members. Do not use spring steel clips and clamps. Provide standoffs as specified in other technical sections.

C. Use self-drilling anchors or expansion anchors on concrete surfaces, sheet metal screws in sheet metal construction, and wood screws in wood construction.

D. The ends of all support members shall be ground smooth.

E. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.

F. Do not use powder-actuated anchors.

G. Do not drill structural steel members.

H. Fabricate supports with welded end caps and all welds and surfaces ground smooth for neat appearance. Use hexagon head bolts with steel spring-lock washers under all nuts.

I. Install surface-mounted cabinets and panelboards with a minimum of four anchors.

J. Do not use chain, wire rope, or perforated strap hangers.

K. All welds shall be continuous and ground smooth.

END OF SECTION

SECTION 26 05 33

CONDUIT

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Rigid metal conduit and fittings.
   2. Rigid aluminum conduit and fittings.
   3. Polyvinyl chloride (PVC) externally and internally coated galvanized rigid metal conduit and fittings.
   4. PVC conduit and fittings.
   5. Liquidtight flexible metal conduit and fittings.
   6. Conduit seals and special fittings.

1.02 REFERENCES

A. ANSI C80.1–Electrical Rigid Steel Conduit (ERSC).

B. ANSI C80.5–Electrical Rigid Aluminum Conduit (ERAC).

C. ANSI/NEMA FB 1–Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable.

D. NEMA RN 1–Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal.

1.03 QUALITY ASSURANCE

A. Manufacturers of Raceways: Firms regularly engaged in the manufacture of electrical raceways of the types and capacities required whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that for the project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL or NRTL Labels: Provide electrical materials, which have been listed and labeled by Underwriters Laboratories or other NRTL.

E. Prior to shipment to the site, all conduit provided shall be new, unused material, and shall not have been stored outdoors or exposed to weather.

F. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Provide color-coded thread protectors on the exposed threads of threaded rigid metal conduit.

B. Handle conduit carefully to prevent end damage and to avoid scoring the finish.

C. Store conduit inside and protect from weather. When necessary to store outdoors, elevate well above grade and enclose with durable, waterproof wrapping.

PART 2–PRODUCTS

2.01 RIGID METAL CONDUIT AND FITTINGS

A. Rigid Steel Conduit: ANSI C80.1 and UL6. Heavy wall seamless tubing with hot-dipped galvanized coating.

B. Conduit bodies for rigid steel conduit shall be Form 35 and be constructed of stamped steel for sizes 2 inches and under, and cast malleable iron for sizes over 2 inches. Conduit bodies shall have domed gasketed covers and stainless steel screws. Conduit bodies sizes 1 1/4-inch and larger shall have built-in pulling rollers. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. Contractor shall select body style and size according to application.

C. Rigid Aluminum Conduit: ANSI C80.5 and UL6A. Heavy wall.

D. Conduit bodies for rigid aluminum conduit shall be Form 85, or equal and be constructed of pressure-cast, copper-free aluminum for sizes 2 inches and under, and sand-cast, copper-free aluminum for sizes over 2 inches. Conduit bodies shall have domed gasketed covers, and stainless steel screws. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. Contractor shall select body style and size per application.

E. PVC-coated conduit and fittings shall be internally and externally hot dipped galvanized rigid metal conduit with hot dipped galvanized threads and PVC coating. PVC coating shall be UL listed with rigid metal conduit as the primary means of corrosion protection for the conduit, and PVC coating shall have an external 40 mil thickness with an internal 2 mil urethane coating. Acceptable manufacturers shall be Plasti-bond RedH_2OT by Robroy Industries, Ocal-Blue by ABB (Thomas & Betts), Calbond, or equal. All installers shall be field-certified from the factory for installation and shall provide proof of certification. PVC-coated conduit and fittings shall meet the following listings and manufacturing standards, without exception:
   1. ANSI C80.1.
   2. UL6.
   3. NEMA RN1.

F. Conduit bodies for PVC-coated rigid conduit shall be as manufactured by Plasti-bond RedH_2OT by Robroy Industries, Ocal-Blue by ABB (Thomas & Betts), Calbond, or equal, and have a 40 mil PVC exterior coating and 2mil red urethane interior coating. Conduit bodies shall be Form 8 style or pulling elbow and include domed, gasketed covers and stainless steel screws. Covers for conduit bodies must have bolts that thread into the conduit body. Snaptight and wedgenut covers are not allowed. Contractor shall select body style and size according to application.

G. Fittings and Conduit Bodies: ANSI/NEMA FB 1 and UL 514B; threaded-type material to match conduit. Split couplings are not allowed.

H. Supports: Provide conduit clamps and supporting devices as specified in Section 26 05 29–Supporting Devices. One-hole straps with conduit clamps and backspacers may be used for surface-mounted rigid galvanized steel conduit.

2.02 PVC CONDUIT AND FITTINGS

A. Conduit: Heavy wall rigid, Schedule 40, Schedule 80 where noted, UL or NRTL listed for underground, encased, and aboveground applications. PVC conduit installed in exterior locations shall be UV resistant.

B. Conduit bodies for PVC conduit shall be suitable for use with Schedule 40 or Schedule 80 PVC conduit. Conduit bodies shall have smooth hubs, textured lids, and foam-in-place gaskets. Contractor shall select body style and size per application.

C. Supports: Provide pipe straps and supporting devices as specified in Section 26 05 29–Supporting Devices.

2.03 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS

A. Liquidtight Flexible Metal Conduit:
   1. Conduit: Spiral-wound, electrogalvanized, single-strip steel with integral grounding conductor continuously enclosed within the entire length of the convolutions. The flexible PVC jacket shall be sunlight-resistant, flame-retardant, and resistant to damage from mild acids. Conduit shall be UL Listed.
   2. Fittings shall be stainless steel, UL listed with thermoplastic elastomer sealing gasket.

2.04 CONDUIT SEALS AND SPECIAL FITTINGS

A. Conduit duct sealing compound shall be UL or NRTL listed.

B. Watertight Hubs: Diecast, insulated and gasketed, rated for wet or dry locations indoors or outdoors, and same material as the conduit being used.

C. Expansion Fittings: Expansion Fittings shall be Internal Grounding type and shall not rely on external bonding jumpers to maintain grounding continuity between raceway components. Fittings used with PVC-coated conduit shall also be PVC-coated.

D. Conduit Thread Joint Compound: UL or NRTL listed electrically conductive, corrosion-resistant thread joint compound compatible with the associated conduit material.

E. Ground bushings shall be threaded-type, insulated throat, malleable iron, 105 degree C rated grounding bushings. Ground bushings shall be compatible with copper conductors. Set screw ground bushings are not acceptable.

PART 3–EXECUTION

3.01 CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

A. Size conduits for branch circuit conductors and control wires so as to have not less than 25% spare capacity after installation; 3/4 inch minimum size. Minimum size for liquidtight flexible metal conduit is 1/2 inch.

B. Maintain at least 1 inch of separation between conduit sizes to 1 1/2 inches and 2 inches between conduits 1 1/2 inches or larger. Maintain 1 foot of separation between signal conduits (below 100 volts) and power conduits (100 volts and above).

C. All conduit shall be supported in accordance with the NEC and as specified herein. This shall apply to all conduit types, including flexible conduit.

D. Provide for the proper application, installation, and location of inserts, supports, and anchor bolts for a satisfactory raceway system. Where any component of the raceway system is damaged, replace or provide new raceway system.

E. Run conduits concealed to avoid adverse conditions such as heat and moisture, to permit drainage, and to avoid all materials and equipment of other trades. Maintain a minimum clearance of 6 inches from all hot water pipes, flues, or any high-temperature piping or ductwork.

F. Conduits shall be attached to building surfaces and not suspended unless installed in a Unistrut-type conduit rack as specified herein. Individual conduits shall not be suspended. Clevis hangers are not allowed.

G. Conduits shall not be run in slabs-on-grade or structural topping slabs.

H. Independently support or attach the raceway system to structural parts of construction in accordance with good industry practice.

I. Conduit attached to building surfaces shall be spaced out to avoid rust and/or corrosion using fittings approved for the use. Use back straps on all conduit or mount conduit with strut channel straps as specified under Section 26 05 26–Supporting Devices. Watertight hubs shall be used in all locations, except they are not required for galvanized rigid steel conduit.

J. Conduits shall be securely fastened to building structure at intervals not exceeding 8 feet or closer, if necessary. Where hangers are necessary, 3/8-inch rod/eyelets/rings/or trapeze type in Unistrut channel and pipe clamps shall be used. Wire or perforated strap iron is not acceptable. PVC conduit shall be securely fastened to building structure at intervals not exceeding 3 feet.

3.02 GENERAL CONDUIT INSTALLATION REQUIREMENTS

A. Interior conduit shall be buried below floor slabs. Exterior conduit shall be buried below grade and concealed in structure walls. Exposed conduit runs shall be avoided. Conduit may be run exposed only where it is impossible to conceal.

B. Run exposed conduit grouped and parallel or perpendicular to construction. Do not route exposed conduits over boilers or other high-temperature machinery nor in contact with such equipment.

C. All conduit installed below grade shall be buried a minimum of 2 feet 0 inches. All conduit installed below floor slabs shall be buried a minimum of 1 foot below slab.

D. PVC-coated rigid steel conduit and PVC conduit installed in earth (interior and exterior) shall be bedded in compacted sand with a minimum of 6-inch cover on all sides.

E. In all PVC conduit runs below grade 200 feet and longer, PVC coated rigid steel conduit shall be used for all 90-degree bends.

F. Ream conduit smooth at ends, cap upon installation, rigidly attach to structural parts of the building, and securely fasten to all outlet boxes, panel cabinets, junction boxes, pull boxes, splicing chambers, disconnect switches, and all other components of the raceway system.

G. Conduits installed for future equipment or electrical work shall be cut off and capped. Conduit ends shall have threaded fittings to accommodate future conduit installation.

H. Provide all empty raceways 2 1/2 inches and over with No. 10 galvanized fishwire, and nylon cord for conduits smaller than 2 1/2 inches. Empty raceways and fishwire/nylon cord shall be identified with permanent label, and label shall include conduit termination point. All empty conduits shall be threaded, capped and flush with finished floor or wall. Exposed conduits shall be threaded and capped.

I. Conduit duct seal shall be provided where conduits pass from the interior to exterior of a conditioned room or building.

J. Liquidtight flexible conduit shall be installed in such a manner that liquids tend to run off the surfaces and not drain toward the fittings.

K. All runs of flexible conduit to equipment and devices shall be as short as practicable, of the same size as the conduit it extends, and with enough slack to reduce the effects of vibration to a minimum. A minimum of 18 inches of flexible conduit shall be installed for each motor.

L. Provide listed conduit expansion-deflection fittings in all conduit runs where movement perpendicular to axis of conduit may be encountered.

M. Conduits shall be pitched so that drainage is toward underground pull boxes and away from all structures.

N. Conduit bends for PVC conduit shall be made using a hot box, heat blanket, or glycol bender. Open flame or point heat sources of any type are not allowed.

O. The PVC-coated rigid conduit manufacturer's touch-up compound shall be used on all conduit interior and exterior bare steel exposed because of nicks, cuts, abrasions, thread cutting, and reaming; minimum six coats.

P. Where below-grade PVC conduit is connected to rigid metal conduit, the length of PVC conduit shall be a minimum of 10 feet. For short, below-grade conduit runs where required lengths of rigid metal conduit limit the length of PVC conduit to less than 10 feet, rigid metal conduit shall be used for the entire run.

Q. Conduit bodies shall not be used for fiber optic cable conduit. Provide pull boxes sized as required for fiber optic cable bending radius. Coordinate sizing requirements with department IT staff.

R. Routing of conduits on exterior of buildings shall be avoided to the extent possible and shall not cover or interfere with lighting, signage, windows, louvers, or other openings. All conduit routing on exterior walls shall be reviewed with engineer for approval prior to installation.

S. Ferrous metal conduit threads cut in the field and factory threads of ferrous metal conduit and nipples not coated with corrosion protection shall be coated with corrosion-resistant thread joint compound.

3.03 CONDUIT PENETRATIONS AND TERMINATIONS

A. Where fittings are brought into an enclosure with a knockout, a gasket assembly consisting of an O-ring and retainer shall be installed on the outside. Fittings shall be insulated throat type.

B. Conduit penetrations for all enclosures (e.g., disconnects, junction boxes, control panels), except for rigid galvanized steel conduit penetrations, shall utilize watertight hubs and enter the sides or bottom of the enclosure. Conduits shall not penetrate the top of the enclosure.

C. Provide conduit expansion fittings in all conduit runs that cross a structural expansion joint and for conduits protruding from earth.

D. All conduits that protrude from poured concrete shall be PVC-coated rigid conduit. Conduit shall extend continuously (i.e., no joints) a minimum of 4 feet beyond the poured concrete (both sides). Where an underground conduit joint or coupling is located within 4 feet of the face of the penetration, the conduit shall be provided with reinforced concrete encasement doweled into the structure wall and continuing a minimum of 1 foot past the connection. PVC-coated rigid conduit 4-foot minimum projection requirement shall begin at, and extend from, the end of the encasement. The intent of this paragraph is to permit contractor to use couplings at the inside face of the formwork.

E. Conduits passing through concrete or similar construction shall be cast in place using PVC-coated rigid conduit extending completely through the construction.

F. Where above-grade conduits pass through cores in existing structures, grout openings between conduit and walls or floors with sand cement mortar.

3.04 CONDUIT INSTALLATION SCHEDULE

A. The following schedule lists specific conduit types allowed in designated areas. Those areas not listed under a specific conduit type shall not have that type of conduit installed:
   1. Rigid steel: Exposed interior locations within the Zebra 12 Building.
   2. Rigid aluminum:
      a. All exposed interior locations.
      b. Exterior locations and locations exposed to weather.
   3. PVC-coated rigid steel:
      a. Conduits protruding from concrete.
      b. Interior and exterior locations.
      c. Earth.
      d. Within 4 feet of a building or structure footing, wall, or underground pull box.
   4. PVC:
      a. Earth, except conduits within 4 feet of a building or structure footing, wall, or underground pull box. PVC conduit under pavement or roadways shall be Schedule 80.
      b. Interior conduit within Salt Storage Building 12 feet 0 inches above finished grade and higher (Schedule 80).
      c. Grounding electrode conductors.
      d. Buried below slabs on grade.
   5. Liquidtight flexible metal conduit not over 3 feet in length for final connections to:
      a. Equipment with sliding bases or flexible positioning.
      b. Equipment with vibration isolation mounting.
      c. Equipment housing ferromagnetic cores or with integral moving components capable of generating noise or vibrations, including motors.

END OF SECTION

SECTION 26 05 35

BOXES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Switch, outlet, and small junction boxes.
   2. Above-Grade Pull and junction boxes.

1.02 REFERENCES

A. ANSI/NEMA OS 2–Nonmetallic Outlet Boxes, Device Boxes, Covers, and Box Supports.

B. NEMA 250–Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 QUALITY ASSURANCE

A. Manufacturers of switches, outlets, boxes, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation Work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL or NRTL Labels: Provide electrical cable, boxes, raceways, wire, connectors, outlets, switches, etc. that have been listed and labeled by Underwriters Laboratories or other NRTL.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

PART 2–PRODUCTS

2.01 SWITCH, OUTLET, AND SMALL JUNCTION BOXES

A. Cast Boxes: Aluminum, deep-type, gasketed cover, threaded hubs.

B. PVC-Coated Cast Boxes: Boxes shall be deep type and be by the same manufacturer as the conduit.

C. Boxes used with PVC conduit shall be PVC or FRP with proper cover and gasket.

D. Covers for junction boxes shall have covers that match box type.

2.02 ABOVE-GRADE PULL AND JUNCTION BOXES

A. Boxes used with PVC conduit shall be PVC or FRP with hinged cover, gasket, and locking system. All other boxes shall be 316 stainless steel with hinged cover, recessed quarter-turn padlocking latches, and gasket, unless otherwise noted.

B. Boxes within the Zebra 12 Building interior shall be NEMA 12, painted steel boxes with hinged cover, recessed quarter turn latches, and gasket.

C. Boxes specified in this section are not allowed to have knockouts.

PART 3–EXECUTION

3.01 COORDINATION OF BOX LOCATIONS

A. Provide electrical boxes as shown on the Drawings and as necessary for splices, taps, wire pulling, cable bending radii, equipment connections, and code compliance.

B. Electrical box locations shown on the Drawings are approximate. Verify location and size of outlet boxes in all work areas prior to rough-in.

C. Where dedicated raceways are provided for different voltage systems or wiring, separate boxes shall also be provided unless acceptable to engineer. Where acceptable to engineer, combined boxes shall be physically divided to separate the wiring.

D. Locate and install boxes to allow access.

E. Locate and install to maintain headroom and to present a neat appearance.

F. All boxes shall be spaced to avoid rust and/or corrosion. All boxes shall be on 1/2-inch standoffs.

3.02 SWITCH, OUTLET, AND SMALL JUNCTION BOX INSTALLATION

A. Provide knockout closures for unused openings.

B. Support boxes independently of conduit.

C. Use multiple gang boxes where more than one device is mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

D. Switch and outlet boxes provided for branch circuits and feeders shall not contain control wiring. Control wiring shall have dedicated pull and junction boxes provided. Wiring for different voltage systems (e.g., 24 V, 120 V, 480 V) shall have dedicated pull and junction boxes for each voltage.

E. Align wall-mounted outlet boxes for switches, receptacles, and similar devices.

F. For switches, devices, and exterior fixtures, use cast boxes with proper cover and gasket.

G. All exposed wall and ceiling outlet boxes shall be cast boxes, unless otherwise noted.

H. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.

I. Boxes shall be of a depth to accommodate wires and splices and shall be equipped with both fixture hanging studs and tapped fixture ears. Boxes shall be installed so that they will support the weight of the fixture. Conduit will not be considered as adequate supports.

J. Cast boxes with 3/4-inch hubs and aluminum fittings and enclosures may be used with all conduit types.

K. Provide PVC-coated cast boxes in all areas where PVC-coated conduit is used. Boxes shall be by the same manufacturer as the PVC-coated conduit.

3.03 ABOVE-GRADE PULL AND JUNCTION BOX INSTALLATION

A. Locate boxes in unfinished areas.

B. Support pull and junction boxes independent of conduit.

C. Knockout punches or saws shall be used for holes; boxes with prepunched holes are not acceptable.

D. Refer to Section 26 05 53–Electrical Identification for junction box labeling requirements.

E. All boxes with a dimension equal to or greater than 12 inches shall be above-grade pull and junction boxes.

END OF SECTION

SECTION 26 05 44

UNDERGROUND PULL BOXES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Underground pull boxes

1.02 REFERENCES

A. Standard Specifications: Unless otherwise indicated, Standard Specifications shall refer to the State of Wisconsin Department of Transportation, Standard Specifications for Highway and Structure Construction, current edition, including all issued supplemental specifications.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

B. Shop drawing submittals shall include the following:
   1. Interior elevations of each wall of all underground pull boxes provided under this Contract. Each conduit shall be identified as to what it serves.
   2. Product data: Manufacturer's technical information for underground pull boxes and accessories proposed for use.

PART 2–PRODUCTS

2.01 UNDERGROUND PULL BOXES

A. Underground pull boxes shall be the type as indicated on the Drawings and shall conform to Section 653 of the Standard Specifications.

PART 3–EXECUTION

3.01 INSPECTION AND COORDINATION

A. Examine conditions under which the Work is to be installed and notify Engineer in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 UNDERGROUND PULL BOX INSTALLATION

A. All work under this section shall be completed in accordance with Section 653 of the Standard Specifications, unless noted otherwise.

B. Coordinate underground pull box installation with new and existing piping, sheeting, and other underground systems and structures, and locate clear of interferences.

C. Install underground pull boxes where shown and verify locations in field.

D. Underground pull boxes shall be considered wet locations for purposes of equipment selection.

E. All conduits shall be pitched so that drainage is toward underground pull boxes and away from all structures.

3.03 GRADING AT UNDERGROUND PULL BOXES

A. Underground pull boxes in unpaved areas shall be built as shown to a rim elevation higher than the original ground. The ground surface shall be graded to drain away from the underground pull boxes. Fill shall be placed around underground pull boxes to the level of the upper rim of the underground pull box frame, and the surface evenly graded on a one (vertical) to five (horizontal) slope to surrounding ground, unless otherwise shown.

B. Contractor shall be solely responsible for proper height of underground pull boxes necessary to reach final grade. Engineer's review of shop drawings for underground pull box components is general in nature, and Contractor shall provide random length underground pull box riser sections to adjust underground pull boxes to meet field conditions for final grading.

END OF SECTION

SECTION 26 05 53

ELECTRICAL IDENTIFICATION

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Nameplates.
   2. Wire and cable markers.

1.02 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

B. Provide schedule for nameplates and labeling tags with shop drawings. Reference Drawings for type used.

PART 2–PRODUCTS

2.01 NAMEPLATES

A. Nameplate material shall be multi-color, two-layer, nonconductive engraving plastic suitable for permanent installations in indoor and outdoor locations. The material shall be UV-resistant and suitable for installation in direct sunlight.

B. Type “A”:
   1. Use:
      a. Each separately mounted disconnect switch.
      b. SPD.
      c. Cabinets, enclosures, above grade pull boxes, and junction boxes.
      d. Panelboards.
   2. Background Color: Black.
   3. Character Color: White.
   4. Character Size: 1/2-inch.
   5. Engraving: See one-line and drawings for labels, or as requested by engineer. Label shall include equipment number and description (i.e., Lighting Panel, LP-1).
   6. Mounting Location: Front exterior.

C. Type “B”:
   1. Use: Conduit fittings, etc.
   2. Background Color: Black.
   3. Character Color: White.
   4. Character Size: 1/4-inch.

D. Type “C”:
   1. Use: Access Control System Equipment.
   2. Size: As necessary.
   3. Background Color: Yellow.
   4. Character Color: Black.
   5. Character Size: 1/4-inch.
   6. Engraving and Mounting Location: As requested by engineer.

2.02 WIRE AND CABLE MARKERS

A. Wire and cable markers shall be permanently-attached, heat-shrink type labels, unless otherwise noted.
   1. Sleeve: Permanent, PVC, white, with legible machine-printed black markings.
   2. Grounding Conductor: Provide green wire marker; minimum 2 inches wide.

B. Data cable labels shall be self-laminating, computer generated vinyl wire labels that allow for the label to rotate to any angle for improved visibility and repositioning. Cable labels shall be manufactured by the same manufacturer as the data cables.

C. Wire or cable numbering preprinted on the conductor or cable insulation, flag-type labels, and individual wraparound numbers (such as Brady preprinted markers) are not acceptable. All wire markers shall be the same throughout the project, except for the data cable labels.

PART 3–EXECUTION

3.01 INSTALLATION

A. Degrease and clean surfaces to receive nameplates.

B. Install nameplates parallel to equipment lines.

C. Affix nameplates with weatherproof, UV-resistant adhesive.

D. Prepare and install neatly-typed circuit directories and schedules in all panels, including, but not limited to, panelboards and existing panels where Work is done under this Contract.

E. Labeling tags shall only be used for equipment enclosures without surfaces suitable for mounting fixed nameplates.

3.02 WIRE IDENTIFICATION

A. Provide wire markers on each conductor, including neutral and spare conductors, in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Neutral conductor labels shall include the associated branch circuit number. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams for control wiring. Spare conductors shall have control wire number or shall indicate termination point of wire.

B. Conductors in pull boxes, control panels, cabinets, and panelboards shall be grouped as to circuits and arranged in a neat manner. All conductors of a feeder or branch circuit shall be grouped, bound together with nylon ties, and identified. Phase identification shall be consistent throughout the system. All wiring labels shall be able to be read without removing wire management (i.e., wiring trough covers, spiral windings, etc.) or twisting the wire/cable.

C. Color code wiring as required by WSEC using manufacturer-applied color-coded insulation covering. Do not use marking tape or other means of electrical conductor identification.

D. Circuit Identification:
   1. Identify power and control conductors at each termination and at accessible locations such as junction and pull boxes, panelboards, etc.
   2. Conductors for panelboard circuits shall identify circuit matching the circuit directory designations, including the neutral conductor.
   3. Control conductor identification shall match the associated terminal block label.

4. Circuits Not Listed in Circuit Directories:
    a. Assign circuit name based on unique device or equipment at load end of circuit.
    b. Where unique device or equipment names are not available or apparent, add a unique number or letter modifier to each otherwise identical circuit name.

3.03 DATA CABLE AND COMMUNICATION EQUIPMENT IDENTIFICATION

A. Individual labels shall be placed on all information outlet faceplates, patch panels, telecommunication closets, and both ends of all cables following existing facility cable labeling standards.

B. Each component shall be clearly labeled using a computer-generated label with an ID identifying each device's location throughout the facility along with a unique identifier to match Outagamie County labeling standards. The Record Drawings shall identify the numbering at each communication cabinet and jack location.

C. Refer to Section 27 10 00–Structured Cabling for cable insulation and jack color requirements.

3.04 JUNCTION BOX IDENTIFICATION

A. All junction boxes shall be labeled with permanent nameplates. Nameplates shall indicate circuit or load served, as well as the power source and highest voltage present on any conductor.

3.05 CONDUIT FITTINGS IDENTIFICATION

A. All conduit fittings that contain splices of any kind shall be labeled with permanent nameplates indicating "splice within." Nameplates shall be clearly visible at location installed. Nameplates shall be fastened to each conduit fitting with heavy duty, UV-resistant, cold weather cable ties.

3.06 COMPONENT IDENTIFICATION

A. All components (e.g., power supplies, transformers, etc.) within enclosures shall be identified with sticky-back adhesive, self-laminating, machine-printed marking labels. Labels shall be installed on the enclosure back panel and not on the device itself, wireway covers, or any other removable devices. Labels shall be included on the as-built drawings.

3.07 LABELING FONT REQUIREMENTS

A. The font for all conductor, cable, and device labels shall be Arial with black characters on white background, and minimum font size 12.

B. The text for all conductor, cable, and device labels shall be machine printed. Handwritten labels are not acceptable.

END OF SECTION

SECTION 26 21 00

ELECTRICAL SERVICE SYSTEM

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Utility company.
   2. Secondary service characteristics.
   3. Definitions.
   4. Underground electrical service.

B. This section applies to permanent services only.

1.02 UTILITY COMPANY

A. The Utility Company is Kaukauna Utilities.

1.03 SECONDARY SERVICE

A. The secondary service will be 120/208-volt, 4-wire, three-phase.

1.04 DEFINITIONS

A. Service: As defined in the NEC, Article 100.

B. Primary Voltage: Above 600 volts.

C. Secondary Voltage: 600 volts and below.

1.05 UNDERGROUND ELECTRICAL SERVICE

A. Provide complete underground electrical service from the utility transformer provided by the Utility Company and department as indicated on the drawings.

B. Provide electrical service system, except the Utility Company and department will provide:
   1. Primary conduit and cable from terminal pole to transformer pad.
   2. Transformer and pad.
   3. Metering at transformer.
   4. Secondary conduit stub-out at transformer.

C. Coordinate the new electrical service with the Utility and department. The department will pay for the work provided by the Utility. All other costs for the electrical service shall be included in the Bid.

PART 2–PRODUCTS

NOT APPLICABLE

PART 3–EXECUTION

3.01 UTILITY COORDINATION

A. Division 26 contractor shall coordinate with the department to give all notices necessary for utilities to perform the Work. Division 26 contractor shall comply with all utility permit requirements.

B. Division 26 contractor shall coordinate with the department to complete all required electrical service applications and forms based on the Drawings and Division 26 contractor’s means and methods for the work required.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Lighting and appliance panelboards.

1.02 QUALITY ASSURANCE

A. Manufacturers: Firms regularly engaged in the manufacture of electrical equipment, cable, and wire products of the types and ratings necessary, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical equipment installation work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical equipment, cable, wire, and connectors.

D. UL or NRTL Labels: All electrical equipment and material shall be listed and labeled by Underwriters Laboratories or other NRTL, except where UL does not include the equipment in their listing procedures.

E. NEMA/ANSI Compliance: Comply with National Electrical Manufacturers Association, American National Standards Institute, and other standards pertaining to material, construction, and testing, where applicable.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. All electrical equipment and material shall be received and stored with the factory tamperproof wrapping intact. Provide factory-wrapped waterproof flexible barrier material for factory packaging of equipment and material to protect against physical damage in transit. Do not install damaged equipment or material; remove from project site. Store equipment in factory coverings in a clean, dry, indoor space that provides protection against weather.

PART 2–PRODUCTS

2.01 PANELBOARDS

A. Lighting and appliance and power distribution panelboards shall be as manufactured by Square D NQ, Eaton Pow-R-Line, or ABB ReliaGear and shall be provided as indicated on the drawings and as scheduled. Panelboards shall be factory-assembled and constructed in accordance with latest NEMA, UL, and NEC requirements and shall bear the UL label. Panelboard cabinets, including boxes and fronts, shall be code gauge galvanized steel. Front covers shall be hinged to allow access to wiring gutters without removal of panel trim (door-in-door type). All fronts shall be complete with cylinder-type lock and catch, and all cylinders shall be keyed alike. Provide two keys per panelboard to department. Panelboard enclosure NEMA rating shall be as indicated on the drawings.

B. Gutter and wiring space shall be provided according to NEMA and UL standards. Contractor shall instruct manufacturer as to where additional wiring space is needed, i.e., top, bottom, right, left, or combination. Where oversized cabinets are necessary for one section of a panelboard, all sections of the panelboard shall be the same size.

C. Panelboards shall have full ampacity bussing throughout (full length of panel) and shall be full-size in regard to number of possible pole spaces. All lighting and appliance panels shall have poles as shown on the drawings. Panelboards shall be identified with phases reading left to right and circuits alternately numbered left to right, odd numbers on the left, even numbers on the right.

D. Panelboards shall have copper bussing. Provide copper ground bus in all panelboards.

E. Lugs for incoming feeders shall be UL listed for use with copper conductors. Lugs shall be sized by contractor in accordance with feeder sizes shown. Main breakers shall be top- or bottom-mounted to coordinate with incoming feeder entrance location. Location shall be selected by contractor.

F. Branch circuit breakers shall be quick-make, quick-break, with thermal magnetic trip bolt-on type. Multipole breakers shall have common internal trip, UL listed as multipole units; handle ties are not permitted. All breakers shall be of the same manufacturer as the panelboard and provided at ampere capacity as scheduled.

G. Main and feeder circuit breakers shall be thermal magnetic trip type.

H. All panelboards scheduled with main circuit breakers shall be individually mounted main circuit breaker panels. Main circuit breakers installed in the location of branch circuit devices (branch-mounted mains) are not acceptable.

I. Panelboards shall be service entrance rated where noted on the drawings. Neutral bus shall be bonded to ground bus. Provide ground lug sized as required for termination of main grounding electrode.

PART 3–EXECUTION

3.01 INSTALLATION

A. Panelboards shall be provided as indicated. Final locations, sizes, and mounting of panelboards shall be reviewed with engineer prior to installation.

B. Each panelboard shall have a typewritten circuit schedule provided on the inside cover. This schedule shall be covered with clear plastic in a metal frame and shall include room name and area or item served by each branch circuit.

C. Prior to final inspection, clean all panelboard interiors, adjust trims, covers, hinges and locks, and refinish covers to original condition.

D. Panel trim shall have enamel finish as selected by department.

E. Balance load on all panelboards so phases are balanced to 15% of each other. Reconnect or redistribute circuits and/or circuit breakers to achieve balanced condition. Submit ammeter readings for all panelboard feeders indicating normal operating load and phase balance.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included:
   1. Wall switches.
   2. Receptacles.
   3. Cover plates.

1.02 REFERENCES

A. NEMA WD 1–General-Color Requirements for Wiring Devices.

B. Drawings–Bill of Materials.

1.03 QUALITY ASSURANCE

A. Manufacturers of switches, outlets, boxes, lugs, etc.: Firms regularly engaged in the manufacture of these products, of the types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL or NRTL Labels: Provide electrical material, etc., which have been listed and labeled by Underwriters Laboratories or other NRTL.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2–PRODUCTS

2.01 WALL SWITCHES

A. A-C general use Industrial specification grade, snap switch, 20 amperes, 277 volts, one of the following: Eaton 122*, Leviton 122*, or Pass and Seymour PS20AC*.

*Complete catalog number for pole arrangement necessary.

B. Provide ivory-colored handles.

2.02 RECEPTACLES

A. Twenty ampere, 125-volt, NEMA 5-20R, Industrial specification grade, straight blade, 3-wire duplex grounded outlets, one of the following: Eaton 5362, Leviton 5362, Pass and Seymour 5362. Provide ivory color.

B. GFCI Receptacles with a weather-resistant (WR) rating: Weather-Resistant duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class-A, including self-test functionality and reverse line-load misfire function repeatability. WR GFCI receptacles shall be Hubbell GFR5362SG*, Leviton GFWR2-*, Pass & Seymour 2097TRWR*, or approved equal. (*indicates color selection). Color shall be ivory.

2.03 COVER PLATES

A. All light switches shall have NEMA 4X industrial gray, toggle switch covers.

B. Indoor outlet boxes within the Zebra 12 Building shall be provided with standard 302 series stainless steel cover plates. All other receptacles shall have an enclosure that is weatherproof whether or not the attachment plug is inserted. Covers shall be gasketed metal with hinged “in-use” device covers, powder coat painted. Non-metallic covers are not allowed. Covers shall be latching type and shall be lockable. Covers shall be identified as “extra-duty” type per NEC 406.9(B)(1).

PART 3–EXECUTION

3.01 INSTALLATION

A. GFCI receptacles shall not be series wired.

B. Install wall switches 48 inches above floor (top of box), “Off” position down, unless otherwise noted.

C. Install receptacles vertically with the grounding pole on the top and at 48 inches above floor (top of box).

D. Install devices and cover plates flush and level.

E. Back wiring is not allowed for switches and receptacles. Wires shall be terminated with the device screw terminal.

F. Individual labels shall be placed on the back of all switch faceplates and receptacle faceplates indicating the lighting panel and circuit from which the switch or receptacle is fed. Labels shall be white background with black lettering no smaller than 12-point font. Provide permanently attached self-adhesive type, machine fed, and self-laminating labels, or equal. All labels must be by the same manufacturer, same size, and same font. Handwritten labels are not acceptable.

END OF SECTION

SECTION 26 28 16

DISCONNECT SWITCHES

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Disconnect switches.

1.02 REFERENCES

A. NEMA KS 1–Enclosed Switches.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

B. Include outline drawings with dimensions and equipment ratings for voltage, capacity, horsepower, and short-circuit.

PART 2–PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Disconnect Switches: Square D Class 3110, Eaton Type DH or ABB Type H.

2.02 DISCONNECT SWITCHES

A. Nonfusible Disconnect Switches: NEMA KS 1; heavy-duty, quick-make, quick-break, load interrupter enclosed knife switch with externally-operable handle interlocked to prevent opening front cover with switch in “On” position. A defeater shall be provided to bypass this interlock. Handle lockable in “Off” position. Switches shall have a UL listed short-circuit rating of 10,000 rms symmetrical amps or more when protected by any overcurrent protective device rated no greater than the ampere rating of the switch.

2.03 ENCLOSURES

A. Provide disconnect switch enclosures as listed, unless noted otherwise on the Drawings. All locations: NEMA 4X, stainless steel.

PART 3–EXECUTION

3.01 INSTALLATION

A. Provide disconnect switches where indicated on the Drawings.

B. Wiring within disconnects shall only be for loads or equipment served by that disconnect. Foreign wiring within disconnect enclosures is not allowed. All wiring within disconnect enclosures shall be landed on lugs or terminals provided by the disconnect manufacturer, or on dedicated terminal strips for field devices. Splices and spring wire connectors are not allowed within disconnect enclosures.

END OF SECTION

SECTION 26 43 13

SURGE PROTECTIVE DEVICES (SPD)

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: Service entrance devices.

1.02 REFERENCES

A. ANSI/IEEE C62.41 and C62.45.

B. NFPA 70, and 75.

C. UL 1449, most recent issue.

1.03 QUALITY ASSURANCE

A. Manufacturers of SPDs. Firms regularly engaged in the manufacture of these products of the types and ratings whose products have been in satisfactory use in similar service for not less than 5 years.

B. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) and any and all local codes as applicable to construction and installation of electrical wiring devices, material, and equipment herein specified.

D. UL Labels: Provide surge protective devices which have been listed and labeled by Underwriters Laboratories or other NRTL.

E. NECA Standard: Comply with applicable portions of National Electrical Contractor's Association's "Standard of Installation."

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

B. Shop Drawings for Equipment Panels: Include wiring schematic diagram, wiring diagram, outline drawing, and construction diagram as described in ANSI/NEMA ICS 1. Test reports certified by the manufacturer shall be provided to engineer upon request for each model submitted.

1.05 WARRANTIES

A. Manufacturer shall provide a minimum 10-year warranty from the date of substantial completion to cover repair or replacement of the device.

PART 2–PRODUCTS

2.01 GENERAL

A. These specifications describe the electrical and mechanical requirements for high energy SPDs.

B. The system individual units shall be UL listed under UL1449, latest edition, Standard for Surge Protective Devices (SPD). Surge ratings shall be permanently affixed to the SPD.

C. Operating Temperature: Operating temperature range shall be -40 to +70°C (-40 to 158°F).

D. Storage Temperature: Storage temperature range shall be -40 to +85°C.

E. Relative Humidity: Operation shall be reliable in an environment with 0% to 95% noncondensing relative humidity.

F. Operating Altitude: The system shall be capable of operation up to an altitude of 13,000 feet above sea level.

G. Design Life: >15 years.

H. Operating Voltage: Maximum continuous operating voltage shall be no less than 125% of the nominal rated line voltage.

I. Power Frequency: SPD power frequency shall be rated for use on 50 and 60 Hertz power systems.

J. All SPDs shall be MOV type. Noise filtering capabilities shall be provided as an option for the devices specified herein.

2.02 SERVICE ENTRANCE DEVICES

A. The maximum surge current capacity of the specified system, based on the standard IEEE 8/20 microsecond waveform, shall be at least 160 kA per phase. The surge life for WYE models (8/20) shall be at least 10kA for 1,500 occurrences (Lx-N & Lx-G modes) and 30kA for 1,500 occurrences (N-G mode). The surge life for delta models (8/20) shall be at least 20kA for 1,500 occurrences (Lx-G modes) and 20kA for 1,500 occurrences (Lx-Lx mode). The transient suppression capability shall be bidirectional and suppress both positive and negative impulses. SPD shall have a nominal discharge rating (I_n) of 40 kA.

B. The SPD shall have a minimum Short Circuit Rating (SCCR) of 200 KAIC. The interrupt capability must be confirmed and documented by a recognized independent testing laboratory.

C. The suppressor shall be designed so as to minimize the internal surge path impedance. Direct point-to-point internal wiring is inherently inductive and not acceptable. Connection to the power service shall be constructed as shown in the manufacturer’s installation notes for best performance.

D. The system shall be constructed using field replaceable plug-in modules. The module shall consist of multiple fuse protected metal oxide varistors. The status of each module shall be locally monitored with a red LED that will illuminate if the module protection is reduced. Protector shall provide redundant protection within each phase module with multiple surge rated fuses per module or one fuse per MOV.

E. Red and green solid-state LED indicators shall be provided on the hinged front cover to indicate protection status. An illuminated green LED indicates power is present at the protector on all phases, and an illuminated red LED shall indicate that one or more of the modules have reduced protection. Both front panel and internal LEDs are required to provide power and fault indications. Relay operation shall be in a failsafe operating mode, i.e., continuously energized so that power failure, reduced protection, or a break in the remote monitoring line will cause a fault indication at the remote monitor. Neon indicators are not permitted.

F. Relay alarm contacts shall be provided for remote alarm monitoring capability of unit status. Surge protected normally open and normally closed contacts shall be provided.

G. The system shall be equipped with an audible alarm which shall be activated when any one or more of the modules has a reduced protection condition. A mute switch shall be provided for the audible alarm.

H. The SPD shall provide effective energy surge diversion for application in ANSI/IEEE C62.41-2002 location Category C3 environments. Testing shall be per ANSI/IEEE C62.45-2002 using ANSI/IEEE C62.41 Category C3 waveforms and amplitudes.

I. A NEMA Type 4X, stainless steel enclosure with corrosion-resistant hardware shall be provided for the unit.

J. Service entrance devices shall be as manufactured by MCG 200M Series, Square D EMA/IMA Series, Eaton SPD Series, or equal.

K. SPD shall be suitable for use in Type 2 locations.

L. Unit shall provide maximum ANSI/UL 1449 VPRs for 208Y/120-volt, three-phase systems.
1. L-N = 700 V.
2. L-G = 700 V.
3. N-G = 600 V.
4. L-L = 1200 V.

PART 3–EXECUTION

3.01 INSTALLATION

A. The installation and testing of the system shall be in full accordance with the manufacturer’s installation and maintenance instructions and all national and local codes.

B. Each installed device shall be fed by an appropriately sized circuit breaker, per the manufacturer’s installation notes, in the protected panel. No SPD shall be installed without an upstream overcurrent device. The cost for providing an appropriately sized circuit breaker shall be included in the bid.

C. Units shall be installed as close as practical to the electrical panel. Low impedance cabling furnished by the manufacturer shall be utilized for installations with lead lengths greater than, or equal to, 5 feet. Low impedance cabling furnished by the manufacturer or appropriately-sized standard cable, if acceptable to engineer, may be utilized for installations with lead lengths less than 5 feet. SPD leads shall be as short as possible.

END OF SECTION

SECTION 26 51 13

LIGHTING

PART 1–GENERAL

1.01 SUMMARY

A. Work includes a complete functional lighting system.

1.02 REFERENCES

A. Underwriters Laboratories or other NRTL: Lighting fixtures shall be manufactured in accordance with the standards of the Underwriters Testing Laboratories and shall bear the UL or other NRTL label where practicable. In all cases the lighting fixtures shall be constructed with UL or other NRTL listed components.

B. Applicable Codes: Fixtures shall be made and installed in accordance with the current version of the National Electrical Code, the Uniform Building Code, the Federal Occupational Safety & Health Act, and other applicable regulations.

C. Code Compliance: Comply with National Electrical Code (NFPA 70) as applicable to construction and installation of electrical equipment, cable, wire, and connectors.

D. NEMA/ANSI Compliance: Comply with National Electrical Manufacturers Association, American National Standards Institute, and other standards pertaining to material and construction and testing where applicable.

E. Lighting Standards:
   1. LM-79-08 or latest–IES Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products.
   2. LM-80-08 or latest–IES Approved Method for Measuring Lumen Maintenance of LED Light Sources.
   3. NEMA SSL 1-2016 or latest–Electronic Drivers for LED Devices, Arrays, or Systems.

1.03 SYSTEM DESCRIPTION

A. Intent: It is the intent of these specifications to obtain a completed lighting fixture and lighting controls installation by contractor. Completed means cleaned, adjusted, tested, and ready for occupancy and operation in accordance with the above-indexed paragraphs and in accordance with the other sections of these Contract Documents. It is the responsibility of contractor to point out discrepancies, errors, and other problems.

B. All lighting fixtures are to be provided complete with all necessary accessories for a proper installation. Catalog numbers shown are basic fixture types, and additional features, accessories, and options specified, scheduled or required, are to be included for all fixtures provided.

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105. Shop drawings shall include, but not be limited to, the following:
   1. Manufacturer’s dimensioned scale drawings showing in complete detail the fabrication of all lighting fixtures including overall and detail dimensions, finishes, prefinishes, metal thickness, fabrication methods, support method, ballasts, drivers, sockets, type of shielding, reflectors, wiring sizes and insulation types,

lenses, provisions for relamping, and all other information to show compliance with the Contract Documents.
2. Installation instructions.
3. Certified photometric test data and reports.
4. Shop drawings shall not only clearly indicate the assigned fixture type, but also the equipment location.
5. Submittal should include, but not be limited to, wattage, lumen output, color temperature, and CRI value.

1.05 QUALITY ASSURANCE

A. Standards: Materials, equipment, and parts, as well as workmanship provided under this section, shall conform to the highest commercial standard as specified and as indicated on Drawings. Fixture parts and components not specifically identified or indicated shall use materials most appropriate to their intended use or function and as such be resistant to corrosion and thermal mechanical stresses encountered in the normal application and function of the fixtures.

B. Measuring and Testing Equipment: Contractor shall have available at all times, instruments for the measurement of voltage, luminaire temperature, lighting level, and fixture brightness level.

C. Manufacturers: Firms regularly engaged in the manufacture of lighting fixtures of the types and ratings for the project, whose products have been in satisfactory use in similar service for not less than 5 years.

D. Installer: A firm with at least 5 years of successful installation experience on projects with electrical wiring installation work similar to that in this project.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Luminaires and lighting equipment shall be delivered to the project complete, including mounting devices and components necessary for the proper operation of the equipment.

B. Marking: All equipment must be clearly and boldly identified as to the fixture type and, where practicable, the fixture location.

C. Timely Purchasing: Luminaires and other appurtenances shall be ordered in a timely fashion and securely stored to be available to meet the project schedule.

1.07 WARRANTY

A. Standard One-Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from Final Completion of the project.

PART 2–PRODUCTS

2.01 LIGHT FIXTURE SCHEDULE

A. Interior Type A Light Fixtures:
1. Light fixtures shall be 179 watt maximum, 120 volt, 24,000 lumen, 5,000 K color temperature, LED fixtures, with stainless steel latches and corrosion resistant finish, manufactured by Metalux Model VT4LED-LD5-24-DRF-UNV-L850-CD2-WL-SSL-U, Linmore Model HD20S-A1-24K-4N-50-80-FR-LV-MLT-SSLCH-10V, or Lithonia Model FHE-L48-24000LM-FST-MD-MVOLT-GZ10-50K-80CRI-WLF.
2. Fixture shall have internal fusing.
3. Fixture shall be UL listed, ETL listed, or CSA-US listed for wet locations.

4. Provide mounting hardware as necessary for mounting locations shown on the drawings.

B. Exterior Type B Light Fixtures:
   1. Light fixtures shall be 90 watt maximum, 120 volt, 9,700-10,200 lumen, 5,000 K color temperature, Type 3 medium distribution, enclosed LED fixtures with integral photocell, manufactured by Cree Model SEC-EDG-3M-WM-08-E-UL-BZ-525-50K-P, McGraw-Edison Model GWC-SA2A-750-1-T3-BZ-BCP, or Current Lighting Solutions Model EWAS-01-1-D3-AW-7-50-N-3-FM-DKBZ.
   2. Fixture shall have internal fusing. Fixture shall be UL listed for wet locations.
   3. Provide mounting hardware as necessary for mounting locations shown on the drawings.

C. Exterior Type C Light Fixtures:
   1. Light fixtures shall be 46 watt maximum, 120 volt, 5,000 lumen, 5,000 K color temperature, Type 3 medium distribution, enclosed LED fixtures with integral photocell, manufactured by Cree Model SEC-EDG-3M-WM-04-E-UL-BZ-525-50K-P, McGraw-Edison Model GWC-SA1A-750-1-T3-BZ-BPC, or Current Lighting Solutions Model EWAS-01-1-B3-AW-7-50-N-3-FM-DKBZ.
   2. Fixture shall have internal fusing. Fixture shall be UL listed for wet locations.
   3. Provide mounting hardware as necessary for mounting locations shown on the drawings.

D. Exterior Type D Light Fixtures:
   1. Light fixtures shall be 236 watt maximum, 120-volt, 25,000 to 30,000 lumen, 5,000K color temperature, NEMA 6x6 distribution, enclosed LED fixtures with adjustable slipfitter for connection to wall-mounting brackets specified herein. Light fixture shall be manufactured by Cree model OSQ-L-C-40L-50K9-66-UL-NM-BZ-F with Q9/Q8/Q7/Q6/Q5/Q4/Q3/Q2/Q1 field adjustable output option and OSQ-L-C-AA-BZ adjustable arm, McGraw-Edison model GFLD-SA3E-750-U-WR-S-BZ with field adjustable drive current (FADC) option, or Current Lighting Solutions model EFH1-02-1-30-66-7-50-N-A-S1-DKBZ-F with option V1 field adjustable module (FAM).
   2. Fixture shall have internal fusing. Fixture shall be UL listed for wet locations.
   3. The light fixture shall be provided with an internal field adjustable light output dimmer module to allow the light output to be adjusted onsite in 10 incremental settings. The module shall be initially set to its maximum setting and adjusted lower onsite after dark as needed to achieve department-desired floodlighting levels.
   4. Each light fixture shall be provided with an L-shaped, bronze-painted steel wall mounting bracket with tenon sized to accommodate the light fixture. Bracket shall be manufactured by Cree model WM-4, United Lighting Standards model SMB-1 with wall mount plate and bronze paint (color to match McGraw-Edison GFLD fixture paint color), or Current Lighting Solutions model RABX-6DB 0FM. Provide additional mounting hardware as necessary for mounting locations shown on the drawings.

2.02 LED LUMINAIRES

A. LED Luminaires shall meet the following technical requirements:
   1. Light output of the LED system shall be measured using the absolute photometry method following IES LM-79 and IES LM-80 requirements and guidelines.
   2. Luminaire efficacy shall match or exceed that of the fixture model numbers specified.
   3. Luminaire Color Rendering Index (CRI) shall match or exceed that of the fixture model numbers specified; a minimum of 80 for interior luminaires and a minimum of 70 for exterior luminaires.
   4. Luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours.
   5. Luminaire lumen output shall match or exceed that of the fixture model numbers specified.

6. Wattage shall be equal to that of the fixture model numbers specified.
7. Luminaire color temperature shall match that of the fixture model numbers specified.

B. Luminaire shall be mercury-free, lead-free, and RoHS compliant.

C. Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.

D. Lumen output shall not depreciate more than 20% after 10,000 hours of use.

E. Luminaire and driver shall be provided from a single manufacturer to promote compatibility.

F. Luminaire shall operate normally for input voltage fluctuations of ±10%.

G. Luminaire shall have a maximum Total Harmonic Distortion (THD) of ≤20% at full input power and across specified voltage range.

2.03 WIRING

A. All wiring within lighting fixtures or from the splice with the building wiring shall be as specified in Section 26 05 19–Wire.

B. Wiring within fixture construction shall be concealed, except where the fixture design or mounting dictates otherwise.

C. Wiring channels and wireways shall be free from projections and rough or sharp edges throughout and all points or edges over which conductors must pass and may be subject to injury or wear.

D. Insulated bushings shall be installed at points of entrance and exit of flexible wiring.

2.04 LED DRIVERS

A. General:
1. Provide driver type as indicated in the model numbers specified.
2. Driver shall have a minimum rated life of 50,000 hours.
3. Driver shall have a minimum power factor of 0.9 and a maximum crest factor of 1.5 at full input power and across the specified voltage range.
4. Driver shall operate normally for input voltage fluctuations of plus or minus 10 percent.
5. Driver shall have a maximum Total Harmonic Distortion (THD) of ≤20% at full input power and across specified voltage range.
6. Wiring connections to LED drivers shall utilize polarized quick-disconnects for field maintenance.
7. Fuse Protection: All luminaires shall have built-in fuse protection. All power supply outputs shall be either fuse protected or be Polymeric Positive Temperature Coefficient (PTC)-protected per Class 2 UL listing.
8. All fixtures located outdoors shall be provided with surge protection.

2.05 MARKING OF FIXTURES

A. Voltage Identification: Fixtures designed for voltages other than 110- to 125-volt circuits shall be clearly marked.

PART 3–EXECUTION

3.01 INSTALLATION

A. Install fixtures, lenses, etc., after building is enclosed, weathertight, and environmental conditions are nominally the same as expected for the complete

spaces. All glassware, reflectors, and refractors shall be clean and free of chips, cracks, and scratches.

B. All wall-mounted fixtures shall be fed through a fixture Stud/Hickey/Nipple assembly and with provisions to prevent fixture turning.

C. All exterior wall-mounted fixtures shown over doorways shall be mounted centered above doorway.

D. All fixtures shall be securely and adequately supported and installed.

E. Surface- or pendant-mounted fixtures shall be attached to and supported from structural part of the building in a manner acceptable to engineer. Fixtures shall be supported by not fewer than two supports for each fixture. Where fixtures are to be suspended, they shall be mounted on steel channel with the channel supported directly from the structure by a minimum of 3/8-inch rod inside rigid conduit stems. Any fixture which has an individual fixture weight of greater than 25 pounds shall have safety cable installed, in addition to other support means. Cable shall be 3/16-inch airplane cable. All fittings and connectors shall be compression type. Cables must be secured to the building structure and to a point or points on the fixture to protect against falling parts.

F. All fixture whips shall be constructed of minimum No. 12 AWG conductors.

3.02 SUPPORTS

A. Mounting Accessories: Fixtures shall be securely attached to prevent movement up, down, or sideways. Fixtures shall be mounted to permit access to wiring. Fastening devices shall be of a positive, locking type, and shall not require the use of special tools to apply or remove. Tie wires shall not be used in place of fastening devices.

B. Contractor Responsibility: Contractor shall verify all ceiling conditions from the Drawings and provide appropriate mounting accessories for each lighting fixture.

C. Pendant Mounting: Provide pendant- or surface-mounted fixtures with required mounting accessories, including hickeys, stud extensions, ball aligners, canopies, and stems. Coordinate locations of fixtures in mechanical areas. Provide mounting stems on pendant fixtures of the correct length to uniformly maintain the fixture heights shown on the Drawings, or established in the field.

D. Adequate rigid, sturdy support shall be provided to prevent the possibility of fixture falling. Surface and pendant fixtures must be supported with two supports per 4-foot section. All pendants must have swivel aligners located at the top ends; pendants shall be minimum 3/8-inch threaded rod inside 3/4-inch rigid steel conduit, unless specifically indicated otherwise on the Drawings, pendant supports shall be painted on jobsite. Support surface-mounted fixtures from structural members other than ceiling tees by providing Unistrut members spanning main ceiling tees or by mounting directly to structure.

3.03 ADJUSTMENT

A. Focusing/Adjustment: After the installation of lighting fixtures is completed, fixtures so requiring (both interior and exterior units), shall be adjusted after dark under the observation of department.

3.04 CLEANING

A. Cleaning: Before final acceptance by department, all protective (strippable) coatings, dust, finger marks, paint spots, and any other materials deleterious to the appearance or functioning of the lighting fixtures must be removed. Abrasive cleaners are not permitted.

3.05 FINAL INSPECTION

A. Upon completion of the installation, lighting equipment must be in first-class operating order and free from defects in condition and finish:
   1. Fixtures shall be completely clean and free from finger marks, dust, plaster, or paint spots.
   2. Any reflectors, lenses, diffusers, side panels, or other parts damaged prior to the final inspection, shall be replaced at no expense to department.
   3. Housing shall be rigidly installed and adjusted to a neat flush fit with the ceiling.

END OF SECTION

SECTION 27 10 00

STRUCTURED CABLING

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: This specification contains the requirements for telecommunications and data cabling, enclosures, termination components, and related subsystems as part of a structured cabling system.

1.02 SYSTEM DESCRIPTION

A. Contractor shall provide and test all cabling and components necessary for a complete and functional structured cabling system as specified herein and shown on the Drawings. Conduit, raceway, and outlet boxes for the “Information Outlets” shall be provided by contractor.

B. Provide all faceplates, patch panels, equipment cabinets, and all other items necessary for equipment connections at all specified data outlets and patch panel(s).

1.03 REGULATORY REFERENCES

A. All Work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the National Electrical Code and present manufacturing standards such as NEMA and ASTM.

B. All materials shall be listed by UL and shall bear the UL label. If UL has no published standards for a particular item, then other national independent testing standards shall apply and such items shall bear those labels. Where UL has an applicable system listing and label, the entire system shall be so labeled.

C. The cabling system shall comply with the following standards:
   1. ANSI/IEEE C2–National Electrical Safety Code.
   2. NFPA 70–National Electrical Code (currently adopted edition).
   3. TIA/EIA Standards 526 14A (OFSPT 14A), 526 7 (OFSPT 7), TIA 568 C.0, TIA 568 C.1, TIA 568 C.2, TIA 568.3 D, TIA 569 B 1, TIA 606 A 1, and TIA J STD 607 A.
   4. IEEE/ANSI 142–Recommended Practice for Grounding of Industrial and Commercial Power Systems.

1.04 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

B. Provide a copy of the Panduit registered installers showing that contractor is a registered installer.

C. Provide scaled telecommunication closet elevation drawings showing all installed equipment.

D. Record Drawings:
   1. Three complete sets of drawings shall be provided by contractor prior to final acceptance.
   2. These drawings shall contain the following:
      a. Any changes made to the system during installation.
      b. Location of all information outlets including jack number identification.
      c. Scaled telecommunication closet elevation drawings showing all installed equipment.

E. Installation Reports:
   1. Cable pulling tension reports.
   2. Telecommunications grounding busbar resistance test reports.
   3. Copper cable acceptance test reports.

F. Technical Manual: Contractor shall furnish three complete technical service manuals containing the following:
   1. Description of maintenance/programming procedures for all equipment and systems.
   2. All warranty information required by manufacturers for submission of warranty claims for all equipment installed.
   3. All testing reports according to Paragraph 3.03.

1.05 QUALIFICATIONS

A. Contractor shall have at least 10 years of experience in the installation of similar systems. contractor shall provide documentation upon request to certify that all assigned staff have attended training courses corresponding to the type of cabling and equipment specified herein.

B. Contractor shall currently be licensed to install low voltage electronic cabling systems in the state of the project.

C. Contractor shall currently meet all manufacturer's requirements for the provision and installation of all equipment specified herein.

D. Contractor shall utilize and have technicians trained in the utilization of the following test equipment: Copper cable certification equipment.

E. Contractor shall be a Panduit certified contractor.

1.06 WARRANTY

A. Standard One Year Warranty: Unless otherwise stated below, manufacturer shall warrant the equipment to be free from defects in material and workmanship for a period of one year from Final Completion of the project.

B. The installation including materials and workmanship shall include the Panduit 25 Year System Warranties.

PART 2–PRODUCTS

2.01 GENERAL

A. Contractor shall provide all necessary power supplies, mounting hardware, and accessories required to install the materials specified herein.

2.02 WALL-MOUNTING BACKBOARD

A. Provide 3/4-inch plywood backboards, size and quantity as indicated on the drawings, permanently attached to the wall with flush mounting hardware where shown on the Drawings. Treat the plywood with a nonconductive, fire resistant gray coating on all sides.

2.03 TELECOMMUNICATION CLOSETS

A. Network equipment shown on the Drawings and specified herein to be provided in a telecommunication closet shall be installed in a double hinged, tri fold rack enclosure suitable for wall mounting. The cabinet shall have a hinged front door with window. The cabinet shall be 18 rack units and be 30 inches deep. Rack mounted equipment

shall be accessible through the front door and through the hinged tri fold center section for rear access. Rack spaces between each network switch and patch panel shall be provided with front and rear horizontal cable management as specified herein. The rear wall section of the cabinet shall include cable management and conduit entries with knockouts. The hinged center cabinet section shall be able to swing open in either direction. Hinge location shall be coordinated with Department and equipment layout onsite and shall allow for the enclosure to fully open for rear access. The center cabinet section shall also latch to the rear wall section in two locations and unlatch using hand operated levers located inside the cabinet.

B. The front door of the cabinet shall include a keyed lock. Provide minimum two keys to department.

C. Non rack mounted equipment shall be located to avoid conflicts with space reserved for future rack mounted equipment and shall not be mounted on the floor of the cabinet.

D. The department will provide a rack mounted UPS backup in each cabinet to allow for continuous operation of all installed equipment. The UPS shall be plug-connected to a line power receptacle in the cabinet. All power connections to UPS shall be plug connected.

E. Provide a rack mounted power strip as specified herein in each cabinet.

F. Horizontal cable management troughs shall be as manufactured by Panduit, Part Number NM2.

G. The cabinet shall be as manufactured by Panduit, Part Number PZWMC1830W.

2.04 COPPER CABLE

A. 300 volt Rated Unshielded Cable:
   1. Provide 4 pair, unshielded twisted pair (UTP), white, plenum-rated cabling with solid, copper only conductors meeting EIA/TIA Category 6 requirements for horizontal station cabling. Cable shall properly rated for Panduit's Category 6 System. Cable shall be listed as suitable for use in locations indicated on the Drawings. Provide Panduit, Part Number PUP6004WH-WLPZ cabling.
   2. Refer to the Execution Section which details the required performance criteria for the permanent link of which the cable is a part. The jacket color for data cables shall be white.
   3. Provide nylon cable ties or reusable hook and loop bands, where specified herein, for bundling cables.

B. Category 6 Ethernet patch cables shall be provided premanufactured by the cable manufacturer or connector manufacturer in sufficient length to connect the associated equipment to the data jack. Field attached plugs shall be insulation displacement type and shall be by the same manufacturer as the cable.

2.05 CONNECTORS

A. Data Station Cables:
   1. Faceplates shall be Mini-Com classic series vertical faceplates as manufactured by Panduit: 1 module space - Part Number CFP1IW; 2 module space - Part Number CFP2IW; 4 module space - Part Number CFP4IW. Blank faceplate inserts shall be off-white, Part Number CMBIW-X.
   2. Jacks: Panduit Mini-Com modular jack (color black), Part Number CJ688TGBL.

2.06 PATCH PANELS

A. Copper (RJ 45) Patch Panels: Patch panels shall be used as a termination point for data jacks and horizontal station cabling as shown on the Drawings and specified herein. Patch panels shall be as manufactured by Panduit, Part Number CP48BLY.

2.07 POWER DISTRIBUTION AND GROUNDING

A. Rack Mounted Power Strip:
   1. Provide a 19-inch rack-mount, 20 amp power strip within each telecommunication closet. The power strip shall be plug connected to a department-provided UPS within the telecommunication closet.
   2. The power strip shall be as manufactured by Tripp-Lite, Model RS-1215-20.

B. Provide a telecommunications grounding bus bar (TGB) in the rear cable section of each telecommunication closet. The TGB shall be a pre drilled copper bus bar provided with standard NEMA bolt hole sizing and spacing and have minimum dimensions of 6 mm thick by 50 mm wide. The connection of the isolated grounding conductor to the TGB shall utilize UL listed two hole compression connections.

PART 3–EXECUTION

3.01 GENERAL

A. Install all equipment and components in accordance with manufacturer's written instructions, in compliance with NEC, ANSI/TIA/EIA 569 B 1 and with recognized industry practices so that all items comply with these Specifications and serve the intended purposes.

B. Refer to Section 26 05 53–Electrical Identification for cable and equipment label requirements. Labels shall be Panduit wire label ID numbers and shall follow the labeling standards of Outagamie County.

C. All cabling shall be installed in accordance with good engineering practices as established by the TIA/EIA and the NEC. Cabling shall meet all applicable local, state, and federal building codes. Data cables shall be terminated according to the TIA 568B standard.

D. Record serial numbers of all items provided that are serialized prior to final acceptance.

E. All items must be complete as specified prior to final acceptance.

F. Copper data cables installed between patch panels and data jacks shall be limited to 90 meters to allow for up to 10 meters of combined patch cable length. Contractor shall identify any cables that cannot be limited to 90 meters and notify engineer prior to installation of any cabling.

3.02 INSTALLATION

A. Cabling–General:
   1. Provide cabling runs from the patch panel to each jack shown on the Drawings. A dedicated cabling run shall be utilized for each jack. Jacks shall be terminated at the patch panel in sequential order, starting from lowest and going to highest.
   2. Bridged taps and splices shall not be permitted as part of the horizontal cabling system.
   3. Provide faceplates and connections in outlet boxes for all jacks shown on the Drawings.
   4. Excess cable behind faceplate connections shall be pulled back into junction boxes and secured to prevent damage to cabling or connections. Provide minimum 10 feet of slack in all cables at the telecommunication closets and manage slack for future use.
   5. Provide grommets and/or bushings in conduit ends to prevent damage to insulation and cables.
   6. Use cable tie tool to install cable ties with appropriate pressure to the cable bundles to prevent damage to cables and provide a smooth cut of excess cable tie. Cable ties shall be able to be turned freely around the bundle of cable. Cable

bundles shall be limited to a 3-inch diameter. Cable ties shall be used for cable bundles above suspended ceilings and shall be plenum rated where required.

7. Use hook and loop bands to secure cable bundles within telecommunication closets. Cable bundles shall be limited to a 3-inch diameter.
8. Tighten connectors and terminals including screws and bolts in accordance with the equipment manufacturer's published torque tightening values for equipment connectors.
9. Allow sufficient slack in cables to prevent premature deterioration of cable system components, and to assist in the maintenance and servicing of cables and/or other building systems and components. Avoid excessive and sharp bends. Manufacturer's recommended pulling tensions shall not be exceeded.
10. Fittings or connections are allowed only at the input and output devices. Splicing is not acceptable in any cable run.
11. All cables shall be installed in conduit.
12. Conduit, raceways, and outlet boxes shall be provided as required.
13. All copper cables shall be routed and installed to avoid light fixtures and other sources of EMI.
14. All cables shall be concealed within conduit. No cables shall be installed where they will be exposed.

B. Grounding:

1. Ground all equipment according to manufacturer's instructions, NEC requirements, EIA/TIA 568B, and EIA/TIA 607.
2. Telecommunications system shall be installed with an isolated grounding system which has only one ground point. That ground point shall be connected to the common grounding electrode via the ground in the main disconnect switch located where shown on the drawings. Provide an isolated grounding conductor installed in conduit from the ground in the Zebra 12 Building SD HD disconnect switch to the telecommunications grounding busbar (TGB) located in each telecommunication closet. This conductor shall be insulated copper with a minimum conductor size of 6 AWG.
3. Contractor shall perform grounding resistance testing on the complete grounding path from the TGB to the service entrance ground. Ground resistance shall not exceed 5 ohms between the TGB and service entrance ground. If the ground resistance test indicates the resistance to be greater than 5 ohms, contractor shall provide a larger dedicated, insulated copper grounding conductor as specified above in conduit from the TGB to the service entrance grounding point.

3.03 TESTING AND ACCEPTANCE

A. General:

1. Contractor is responsible to perform certification tests as indicated below for each subsystem as it is completed.
2. Contractor is responsible for supplying all equipment and personnel necessary to conduct the certification tests. Prior to testing, contractor shall provide a summary of the proposed test plan for each cable type, including equipment to be used, set up, test frequencies or wavelengths, results format, etc. The method of testing shall be subject to review by engineer.
3. Contractor shall visually inspect all cabling and termination points to verify that they are complete and conform to the wiring pattern specified herein. Contractor shall provide engineer with a written certification that this inspection has been made.
4. Contractor shall conduct certification testing according to a schedule coordinated with department. Representatives of department may be in attendance to witness the test procedures. Contractor shall provide a minimum of one-week advance notice to engineer to allow for such participation. The notification shall include a written description of the proposed tests, including copies of blank test result sheets to be used.
5. Failure to provide the above information shall be grounds for department/engineer to reject any and all Documentation of Results on related testing, and to require a repeat of the affected test.
6. Tests related to connected equipment of others shall only be done with the permission and presence of contractor involved. Contractor shall ascertain that testing only as required to prove the wiring connections are correct.

7. Contractor shall provide test results and describe the method of the tests, including the date of the tests, the equipment used, and the procedures followed. At the request of engineer, contractor shall provide copies of the original test results.
8. All cabling shall be 100% fault free. If any cable is found to be outside the specification defined herein, that cable and the associated termination(s) shall be replaced at the expense of contractor. The applicable tests shall then be repeated.
9. Should it be found by engineer that the materials or any portion thereof provided under this Contract fail to comply with the Specifications and Drawings, with respect or regard to the quality, amount of value of materials, appliances, or labor used in the Work, it shall be rejected and replaced by contractor, and all Work disturbed by changes necessitated in consequence of said defects or imperfections shall be made good at contractor's expense.

B. Copper Data Cabling:
1. Testing shall be from the jack to the patch panel on which the cables are terminated.
2. Cables shall be free of shorts within the pairs, and be verified for continuity, pair validity and polarity, and compliance with termination standards. Any defective, split or mispositioned pairs must be identified and corrected.
3. In addition to the above, Certification Testing shall be performed on all cables. Testing of the Transmission Performance of station cables (Category 6 and above) shall include the following:
4. Length.
    a. Attenuation.
    b. Pair to Pair NEXT Loss (new limits).
    c. PSNEXT Loss.
    d. Return Loss.
    e. Pair to Pair ELFEXT Loss (Equal Level Far End Cross talk).
    f. PSEFEXT Loss.
    g. Propagation Delay.
    h. Delay Skew.
    i. Return Loss.
5. Cables shall be tested to the maximum frequency defined by the standards covering their performance category. Transmission performance testing shall be performed using a test instrument designed for testing to the specified frequencies. Test records shall verify "PASS" on each cable and display the specified parameters–comparing test values with standards based "templates" integral to the unit.
6. Testing shall be per ANSI/TIA/EIA 568 C.2 Basic Link test configurations.
7. In order to establish testing baselines, cable samples of known length and of the cable type and lot installed shall be tested. The cable may be terminated with an 8 position Category 6 Modular plug (8 pin) to facilitate testing. Net Propagation Velocity (NPV) and nominal attenuation values shall be calculated based on this test and be utilized during the testing of the installed cable. This requirement can be waived if NPV data is available from the cable manufacturer for the exact cable type under test.
8. In the event results of the tests are not satisfactory, contractor shall make the necessary adjustments, replacement, and changes, and then repeat the test or tests which disclosed faulty or defective material, equipment, or installation method, and shall perform additional tests as required by engineer at no additional cost to department.

C. Upon completion of the installation, contractor shall provide complete test reports to engineer for review. Documentation shall include the following items:
1. Test results submitted in PDF format.
2. Insertion loss test data, including a record of test wavelengths, cable type, cable (or Outlet) i.d., measurement direction, test equipment type, model and serial number, date, reference setup, and crew member name(s).

END OF SECTION

SECTION 28 10 00

ACCESS CONTROL SYSTEM

PART 1–GENERAL

1.01 SUMMARY

A. Work Included: This section includes the access control system.

1.02 QUALITY ASSURANCE

A. Access Control System Supplier (ACSS) requirements:
   1. The ACSS selected for this project must be a direct manufacturer authorized representative of the products specified. All technicians assigned to assist with installation and configure this system shall be factory trained and certified for the proper installation of this equipment. The ACSI must have a minimum of 5 qualified and factory trained technicians to support this system. This company must be of established reputation and experience, regularly engaged in the supply and support of such systems for a period of at least five consecutive years. This company shall have a fully staffed office of sales and technical support representatives within 100 miles of travel time to this project.
   2. The ACSS shall agree, in writing, as part of their proposal, to provide both warranty and non-warranty service within 4 hours of notification of a problem. The ACSS shall be able to perform any and all repairs to the system within 24 hours.
   3. The ACSS shall have knowledge of, and previous experience with, the existing onsite access control system programming and equipment.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with provisions of Standard Specification Section 105.

B. Provide wiring diagrams, equipment ratings, dimensions, and finishes for all proposed devices and equipment.

C. Provide battery calculations that indicate device loads due to the various devices and panel components/modules. Battery calculations shall illustrate the minimum battery capacity required and the capacity actually provided.

D. Provide a fully functional Access Control System one line diagram including: Point of origin of each circuit (usually a Panel or a Module within a panel), circuit type and labeling, area served by each circuit, wire/cable type and size, locations of panelboards where primary system power is obtained, and the device type and circuit(s) to which the device is connected.

E. Provide “worst case” circuit voltage drop calculation.

1.04 AS-BUILT DRAWINGS

A. Record Drawings shall include the location of all devices with their respective labels.

B. Upon completion of the work and final acceptance by the local authority, contractor shall submit Record Drawings to department and engineer.

1.05 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include source and current prices of replacement parts and supplies and recommended maintenance procedures and intervals.

C. Provide wiring diagrams, equipment ratings, dimensions, and finishes for all proposed devices and equipment.

D. Provide battery calculations that indicate device loads due to various devices and panel components/modules. Battery calculations shall illustrate the minimum battery capacity required and the capacity actually provided.

E. Provide a fully functional Access Control System one line diagram including: point of origin of each circuit (usually a Panel, or a Module within a Panel), circuit type and labeling, area served by each circuit, wire/cable type and size, locations of panelboards where primary system power is obtained, the device type circuit(s) to which the device is connected, and location of field devices.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide additional plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer’s written instructions.

1.07 SYSTEM DESCRIPTION

A. Provide a fully functional operating Access Control System that is compatible with, and integrated into, the existing Sielox card access system within the Outagamie County Highway Department main building on-site. The System shall include proximity card readers, controllers, electronic locks (electric strikes by Division 08), programming of all new equipment and existing equipment to integrate the new access control system equipment into the existing access control system on-site, wiring, and all other equipment necessary for a fully functional access control system.

B. Contractor shall be responsible for providing final working drawings based on the information shown on the Drawings and field observations. Contract Documents indicate design intent and do not show all details required for a fully functional system. Contractor shall make their own determination of equipment to provide, and installation requirements thereof.

C. Contractor shall inspect all work. The Bid shall include everything necessary to obtain a fully functional installation operating in accordance with these specifications. All responsibility for these systems ultimately lies with contractor.

D. Contractor shall be responsible for the placing of circuits and making of electrical connections in accordance with the manufacturer furnished drawings, instructions, and field supervision to provide proper connection. The Contract shall include the services of the ACSI engineer to supervise making of connections to power supplies, communication circuits, field devices, existing equipment, and any other connections external to the new access control equipment; to adjust the equipment; initiate and check operation; place the equipment in operation in a manner fully satisfactory to department, and provide instruction to department’s staff on operation and maintenance of the equipment.

E. The security system has been designed to support an advanced distributed network architecture whereas Intelligent System Controllers do not need to be home-run wired back to the database server. All new Intelligent System Controllers shall be connected to the LAN/WAN network. These control panels shall communicate with the database server using industry standard network hub, switches, and routers.

Secure TCP/IP communication protocols shall be used for data transmission across this distributed network system. Any access control workstation running licensed security system software shall have full access to this network.

F. Post start up support shall include follow up services such as replacement of defective equipment, as well as additional training, software modifications, and control configurations as requested by department. This shall include an allowance of 8 hours for work on site other than warranty repair or replacement of defective equipment. This time shall be used for software enhancements and modifications to improve operation of the system. In addition to these 8 hours, include two trips to the site.

PART 2–PRODUCTS

2.01 SYSTEM CONTROLLERS

A. The Access Control System controllers shall be Sielox AC-2700 access controllers, and shall be compatible with the existing access control system at the site. The controller shall be connected to the existing Sielox server equipment by Ethernet connection.

B. The panel controller shall be able to control up to two card readers.

C. The controller and associated components shall be mounted within an overall power supply/charger control panel enclosure:
   1. Enclosed low voltage power supplies/chargers shall be model FPO150-E4 as manufactured by LifeSafety Power.
   2. The enclosure/low voltage power supply shall be provided to house the access control system controller, associated controller components, and to convert incoming 110VAC, 60 Hz power input to a continuous 12 or 24VDC power supply for power to internal control panel components as well as the external card readers and electric door strikes.
   3. The enclosure shall be provided with a secondary DC-DC board, model LSP-B100 as manufactured by LifeSafety Power.
   4. The power supply enclosure and components shall be UL listed, NFPA compliant, and Class 2-rated.
   5. The enclosure shall be a NEMA 1, hinged cover enclosure and shall be supplied with a key lockable door. Provide a tamper switch to supervise the status of the enclosure door and activate an alarm condition upon opening the door. The switch shall be wired to an access controller input for remote monitoring through the existing access control software.
   6. LifeSafety Power power controller modules with relay-controlled protected outputs shall be provided within the enclosure for control of the electric door strikes. Power to each electric door strike shall be wired through a dedicated output on the modules. Relay outputs quantities shall be provide as required based on the number electric door strikes.
   7. All components shall be installed and wired within the enclosure by the ACSI.
   8. The enclosed access control panel assembly shall accept a 120 volt, 60 Hz hardwired connection for power.

D. A battery shall be provided to provide uninterrupted power during short power outages. The battery shall be a 12VDC/12AH sealed lead acid battery.

2.02 PROXIMITY CARD READER

A. The proximity reader shall be model Signo 40 as manufactured by HID Corporation. The reader shall be connected in the Wiegand output format compatible with the existing access control system. Any other protocol is not acceptable. Each card reader shall be labeled under the front cover plate. Labeling shall include the card reader number and identify the controller that it is connected to. Junction boxes shall

be labeled with the reader controller name (Example: “Reader YE-1, Salt Storage Facility Controller”).

B. Proximity reader shall be sealed, waterproof, weather resistant and tamperproof, suitable for outdoor wall-mounting applications. The card reader shall be designed to operate properly within relative humidity range of 0% to 95% non-condensing and within a temperature range -31°F to +150°F.

C. Proximity reader shall be designed to be mounted and operated on any surface including metallic surfaces.

D. Tamper Resistance: Physical damage shall not allow access to any circuitry which would allow the system to be compromised. Transmission of any frequency (or set of frequencies) into the card reader at any power level shall not compromise the system.

E. Proximity reader shall connect to controller via cable as specified by the manufacturer. All required power shall come from controller via cable.

F. Proximity reader and line integrity shall be monitored continuously and shall alarm if failure is detected.

2.03 ASSOCIATED EQUIPMENT

A. Approved input and output devices shall include: Electric strikes shall be furnished as specified in Division 08 by door hardware supplier. ACSI shall coordinate electric strike operation voltage. All electric strikes shall be wired fail-secure, unless noted otherwise on the Drawings. The ACSI shall coordinate with Division 08 on the placement of all electronic locking hardware for this project. The ACSI shall provide low voltage power supplies within the access control panel suitably sized for power to all electric locks.

2.04 WIRE AND CABLE

A. Contractor shall provide all wire and cable required to install systems as indicated. Wire and cable shall be sized to provide minimum voltage drop and minimum resistance to the devices being supplied.

B. All cables shall comply with equipment manufacturer and ACSI recommendations for wire and cable.

C. All cables shall be plenum rated and specifically designed for their intended use.

D. Cabling installed outdoors or underground shall be UL or NRTL listed for use underground and in wet locations.

E. Cable shall comply with all applicable codes and ordinances.

2.05 LIGHTING PROTECTION

A. Provide suitable lightning protection on all power and data connections for all processors/controllers within all controller enclosures. Surge protection type shall be as recommended by the ACSI.

B. All lightning protection equipment shall be UL or other NRTL listed.

PART 3–EXECUTION

3.01 GENERAL

A. All products provided shall be new and unused, shall be compatible with the existing access control system on-site, and shall be of manufacturer's current and standard production.

B. Where two or more equipment items of the same kind are provided, all shall be identical and provided by the same manufacturer.

C. Drawings and specifications indicate major system components and may not show every component, connector, module or accessory that may be required to support the operation specified. The ACSI and contractor shall provide all components needed for fully functional and satisfactory operation.

D. The system shall utilize controllers and add-on boards as appropriate for the specific installation. Controllers shall be fully integrated with the existing access control system on-site, and shall be of the latest design with the current version of firmware. Each reader shall be the model and size most appropriate for the individual application.

3.02 SYSTEM OPERATION

A. ACSI shall be responsible for the integration of all access control system components into the existing access control system at the site. Functionality for the new access control equipment shall be programmed to match the existing access control system functionality.

3.03 INSTALLATION

A. All access control system cabling shall be installed in conduit provided as specified in Division 26.

B. Design, layout, size, and plan new wire and cable runs as required.

C. All cables shall be run parallel and perpendicular to building walls and structure.

D. All wire and cable from the processors to devices at each door shall be “homeruns” unless otherwise specified.

E. All wire and cable passing through metalwork shall be sleeved by an approved grommet or bushing.

F. Avoid splicing conductors. All splices shall be made in junction boxes (except at equipment). Splices shall be made with an approved crimp connection. Wire nuts shall not be used on any low voltage wiring.

G. Identify all wire and cable at terminations and at every junction box. Identification shall be made as specified in Section 26 05 53–Electrical Identification.

H. Identify all inputs and outputs on terminal strips with permanent marking labels.

I. Neatly dress and tie all wiring. The length of conductors within enclosures shall be sufficient to neatly train the conductor to the terminal point with no excess. Run all wire and cable parallel or normal to walls, floors and ground.

J. Install connectors as required by equipment manufacturers.

K. Terminations shall be made so that there is no bare conductor at the terminal. The conductor insulation shall bear against the terminal or connector shoulder.

L. Do not obstruct equipment controls or indicators with wire or cable. Route wire and cable away from heat producing components such as resistors, regulators, and the like.

M. All communications cables shall be kept separate from power circuits.

N. The ACSI shall interface the door electric strike hardware provided as specified under Division 08 with the access control system.

3.04 TESTS AND ADJUSTMENTS

A. Provide functional testing necessary to verify correct operation of the complete access control system. System operation shall be demonstrated and considered acceptable to the department.

END OF SECTION

18.3 Fence Temporary 6-Foot, Item SPV.0090.01.

A Description

This special provision describes furnishing, erecting and maintaining temporary chain link fence 6-foot including gates, as shown on the plans and as directed by the engineer, according to standard spec 616 and as hereinafter provided.

B Materials

Fencing parts furnished do not have to be new materials. Used, re-rolled and open seam materials will be permitted. Gates shall be a minimum of 12 feet wide.

No specific metallic coating will be required for the chain link fencing materials. Materials furnished do not have to be of the same type. Fence height shall be a minimum of 6 feet.

The engineer may reject fencing materials which, in the engineer's opinion, are too damaged or misaligned to provide acceptable closure.

C Construction

In paved areas fence posts shall be fastened to either temporary concrete barrier or metal tube stands ensuring a secure enclosure.

D Measurement

The department will measure Fence Temporary 6-Foot in place by the linear foot from end posts, center to center, along the ground line, acceptably completed. Temporary fence will be measured once for payment. Additional measurement for fence maintenance and removal will not be made

E Payment

The department will pay for the measured quantity at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0090.01	Fence Temporary 6-Foot	LF

Payment is full compensation for furnishing all materials; erecting posts and bases, gates and fence; maintaining fencing; removing and disposing of fencing; and for restoring disturbed areas.

ADDITIONAL SPECIAL PROVISION 4

This special provision does not limit the right of the department, prime contractor, or subcontractors at any tier to withhold payment for work not acceptably completed or work subject to an unresolved contract dispute.

Payment to First-Tier Subcontractors

Within 10 calendar days of receiving a progress payment for work completed by a subcontractor, pay the subcontractor for that work. The prime contractor may withhold payment to a subcontractor if, within 10 calendar days of receipt of that progress payment, the prime contractor provides written notification to the subcontractor and the department documenting "just cause" for withholding payment.

The prime contractor is not allowed to withhold retainage from payments due subcontractors.

Payment to Lower-Tier Subcontractors

Ensure that subcontracting agreements at all tiers provide prompt payment rights to lower-tier subcontractors that parallel those granted first-tier subcontractors in this provision.

Acceptance and Final Payment

Within 30 calendar days of receiving the semi-final estimate from the department, submit written certification that subcontractors at all tiers are paid in full for acceptably completed work.

ADDITIONAL SPECIAL PROVISIONS 5
FUEL COST ADJUSTMENT

A Description

Fuel Cost Adjustments will be applied to partial and final payments for work items categorized in Section B as a payment to the contractor or a credit to the department. ASP-5 shall not apply to any force account work.

B Categories of Work Items

The following items and Fuel Usage Factors shall be used to determine Fuel Cost Adjustments:

(1) Earthwork.		Unit	Gal. Fuel Per Unit
205.0100	Excavation Common	CY	0.23
205.0200	Excavation Rock	CY	0.39
205.0400	Excavation Marsh	CY	0.29
208.0100	Borrow	CY	0.23
208.1100	Select Borrow	CY	0.23
209.1100	Backfill Granular Grade 1	CY	0.23
209.1500	Backfill Granular Grade 1	Ton	0.115
209.2100	Backfill Granular Grade 2	CY	0.23
209.2500	Backfill Granular Grade 2	Ton	0.115
350.0102	Subbase	CY	0.28
350.0104	Subbase	Ton	0.14
350.0115	Subbase 6-Inch	SY	0.05
350.0120	Subbase 7-Inch	SY	0.05
350.0125	Subbase 8-Inch	SY	0.06
350.0130	Subbase 9-Inch	SY	0.07
350.0135	Subbase 10-Inch	SY	0.08
350.0140	Subbase 11-Inch	SY	0.09
350.0145	Subbase 12-Inch	SY	0.09

C Fuel Index

A Current Fuel Index (CFI) in dollars per gallon will be established by the Department of Transportation for each month. The CFI will be the price of No. 2 fuel oil, as reported in U.S. Oil Week, using the first issue dated that month. The CFI will be the average of prices quoted for Green Bay, Madison, Milwaukee and Minneapolis.

The base Fuel Index (BFI) for this contract is $2.55 per gallon.

D Computing the Fuel Cost Adjustment

The engineer will compute the ratio CFI/BFI each month. If the ratio falls between 0.85 and 1.15, inclusive, no fuel adjustment will be made for that month. If the ratio is less than 0.85 a credit to the department will be computed. If the ratio is greater than 1.15 additional payment to the contractor will be computed. Credit or additional payment will be computed as follows:

(1) The engineer will estimate the quantity of work done in that month under each of the contract items categorized in Section B.

(2) The engineer will compute the gallons of fuel used in that month for each of the contract items categorized in Section B by applying the unit fuel usage factors shown in Section B.

(3) The engineer will summarize the total gallons (Q) of fuel used in that month for the items categorized in Section B.

(4) The engineer will determine the Fuel Cost Adjustment credit or payment from the following formula:

$$FA = \left(\frac{CFI}{BFI} - 1\right) x\ Q\ x\ BFI$$

(plus is payment to contractor; minus is credit to the department)

Where	FA	=	Fuel Cost Adjustment (plus or minus)
	CFI	=	Current Fuel Index
	BFI	=	Base Fuel Index
	Q	=	Monthly total gallons of fuel

E Payment

A Fuel Cost Adjustment credit to the department will be deducted as a dollar amount each month from any sums due to the contractor. A Fuel Cost Adjustment payment to the contractor will be made as a dollar amount each month.

Upon completion of the work under the contract, any difference between the estimated quantities and the final quantities will be determined. An average CFI, calculated by averaging the CFI for all months that fuel cost adjustment was applied, will be applied to the quantity differences. The average CFI shall be applied in accordance with the procedure set forth in Section D.

Additional Special Provision 6 (ASP-6)
Modifications to the standard specifications

Make the following revisions to the standard specifications.

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107 Legal Relations and Responsibility to the Public

Add subsection 107.27 effective with the November 2024 letting.

107.27 Drones or Unmanned Aircraft Systems (UAS)

107.27.1 Licensing and Compliance

(1) Obtain and possess the necessary Federal Aviation Administration (FAA) licenses and certifications to operate drones commercially (https://www.faa.gov/uas).

(2) Comply with all FAA regulations, airspace restrictions, and local laws. Operators of small drones that are less than 55 pounds for work or business must follow all requirements as listed in Title 14, Chapter 1, Subchapter F, Part 107 of the Code of Federal Regulations (14 CFR) and obtain a remote pilot certificate (https://www.faa.gov/uas/commercial_operators).

(3) Comply with Wisconsin State Statute 942.10. Limit operations to the specific approved purpose and employ reasonable precautions to avoid capturing images of the public except those that are incidental to the project.

(4) Provide copies of waivers required for specific project conditions to the engineer prior to any flight.

107.27.2 Flight Approval, Safety, and Incident Reporting

(1) Submit information in 107.27.2(2) to obtain written drone flight approval from the engineer at least 3 business days prior to operating a drone within the right-of-way. Do not operate a drone within the right-of-way unless approved by the engineer.

(2) Drone flight application for review and approval must include:

- UAS pilot information and qualifications, images of certification
- UAS drone information and FAA tail numbers
- Max/ Min allowable flight parameters (weather)
- Specifics of flight mission: capture scope
- Estimated flight duration
- Pre-flight checklist
- Site-specific parameters
- Notification protocols - Federal/Local/Agency/Owner/Responsible in Charge
- Confirmation and verification of approved operators and hardware
- Flight plan map diagram (including launch and landing location)
- FAA-Airspace flight map classification and confirmation with graphics
- UAS incident management protocol

(3) If contractor is requesting multiple types of the same flight, a simplified request can be submitted listing weekly flight plan.

(4) Safety measures must include but are not limited to:

- Regular training and updates on drone regulations are required and must be provided upon request.
- Drones must be operated in accordance with safety guidelines, including maintaining a safe distance from people, structures, vehicles, etc.
- Conduct a pre-flight safety assessment, considering weather conditions, airspace restrictions, and potential hazards.
- Emergency procedures (e.g., drone malfunction, loss of control) must be documented and followed.
- All incidents must be reported to the engineer.

(5) If the drone has an incident during flight, report the following to the engineer:

- Incident background and details.
- FAA (14 CFR 107.9) and NTSB (49 CFR 870) notification protocol.
- Contractor internal notification protocol.

107.27.3 Insurance Requirements

(1) Maintain drone liability insurance with the following limits.

1. For drones weighing 10 pounds or less, a liability policy with a minimum limit of $1,000,000.00 is required.

2. For drones weighing more than 10 pounds and less than or equal to 20 pounds, a liability policy with a minimum limit of $2,000,000.00 is required.
3. For drones weighing more than 20 pounds, notify engineer and department will determine appropriate liability policy coverage levels based on size, use, location, and other risk factors.

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646 Pavement Markings

646.3.2.4 Black Epoxy

Replace paragraph (1) with the following effective with the November 2024 letting.

(1) Apply black epoxy in a grooved slot directly after the white marking. Apply epoxy at a wet mil thickness of 20. Apply black aggregate at or exceeding 25 pounds per gallon of epoxy. Do not apply glass beads to black epoxy.

ERRATA

204.3.1.3 Salvaging or Disposal of Materials

Replace paragraph (2) to correct link from 203.3.4 to 203.3.5 effective with the November 2024 letting.

(2) Dispose of concrete, stone, brick, and other material not designated for salvage as specified for disposing of materials under 203.3.5.

204.3.2.3 Removing Buildings

Replace paragraph (2) to correct link from 203.3.4 to 203.3.5 effective with the November 2024 letting.

(2) Buildings removed and materials resulting from building removal become the contractor’s property unless the contract specifies otherwise. Dispose of unclaimed and removed material as specified for disposing of materials in 203.3.5.

335.3.2 Rubblizing

Replace paragraph (6) to correct link from 203.3.4 to 203.3.5 effective with the November 2024 letting.

(6) Remove reinforcing steel exposed at the surface by cutting below the surface and disposing of the steel as specified in 203.3.5. Do not remove unexposed reinforcing steel.

335.3.3 Compacting

Replace paragraph (2) to correct link from 203.3.4 to 203.3.5 effective with the November 2024 letting.

(2) Remove loose asphaltic patching material, joint fillers, expansion material, or other similar materials from the compacted surface. Also remove pavement or patches that have a maximum dimension greater than or equal to 6 inches that are either not well seated or projecting more than one inch. Dispose of removed material as specified in 203.3.5.

526.3.4 Construction, Backfilling, Inspection and Maintenance

Replace paragraph (3) to correct link from 203.3.4 to 203.3.5 effective with the November 2024 letting.

(3) Maintain temporary structures and approaches in place until no longer needed. Unless the engineer directs otherwise, completely remove and dispose of as specified in 203.3.5. Contractor-furnished materials remain the contractor's property upon removal.

602.3.6 Concrete Rumble Strips

Replace paragraph (5) to correct link from 203.3.4 to 203.3.5 effective with the November 2024 letting.

(5) At the end of each workday, move equipment and material out of the clear zone and sweep or vacuum the traveled way pavement and shoulder areas. Sweep away or vacuum up milling debris before opening adjacent lanes to traffic. Dispose of waste material as specified in 203.3.5; do not place on the finished shoulder surface.

604.2 Materials

Replace paragraph (1) with the following information to remove line and link for crushed aggregate effective with the November 2024 letting. The crushed aggregate gradation information for slope paving is now found in 604.2(3).

(1) Furnish materials conforming to the following:

Water	501.2
Select crushed material	312.2
Concrete	501
Reinforcement	505
Expansion joint filler	415.2.3
Asphaltic materials	455.2

ADDITIONAL SPECIAL PROVISION 7

A. Reporting 1st Tier and DBE Payments During Construction

1. Comply with reporting requirements specified in the department's Civil Rights Compliance, Contractor's User Manual, Sublets and Payments.
2. Report payments to all DBE firms within 10 calendar days of receipt of a progress payment by the department or a contractor for work performed, materials furnished, or materials stockpiled by a DBE firm. Report the payment as specified in A(1) for all work satisfactorily performed and for all materials furnished or stockpiled.
3. Report payments to all first tier subcontractor relationships within 10 calendar days of receipt of a progress payment by the department for work performed. Report the payment as specified in A(1) for all work satisfactorily performed.
4. All tiers shall report payments as necessary to comply with the DBE payment requirement as specified in A(2).
5. DBE firms must enter all payments to DBE and non-DBE firms regardless of tier.
6. Require all first tier relationships, DBE firms and all other tier relationships necessary to comply with the DBE payment requirement in receipt of a progress payment by contractor to acknowledge receipt of payment as specified in A(1), (2), (3) and (4).
7. All agreements made by a contractor shall include the provisions in A(1), (2), (3), (4), (5), and (6), and shall be binding on all first tier subcontractor relationships, all contractors and subcontractors utilizing DBE firms on the project, and all payments from DBE firms.

B. Costs for conforming to this special provision are incidental to the contract.

NOTE: CRCS Prime Contractor payment is currently not automated and will need to be manually loaded into the Civil Rights Compliance System. Copies of prime contractor payments received (check or ACH) will have to be forwarded to paul.ndon@dot.wi.gov within 5 days of payment receipt to be logged manually.

***Additionally, for information on Subcontractor Sublet assignments, Subcontractor Payments and Payment Tracking, please refer to the CRCS Payment and Sublets manual at:

https://wisconsindot.gov/Documents/doing-bus/civil-rights/labornwage/crcs-payments-sublets-manual.pdf

ADDITIONAL SPECIAL PROVISION 9

Electronic Certified Payroll or Labor Data Submittal

(1) Use the department's Civil Rights Compliance System (CRCS) for projects with a LET date on or before December 2024 and AASHTOWare Project Civil Rights and Labor (AWP CRL) for projects with a LET date on or after January 2025 to electronically submit Certified Payroll Reports for contracts with federal funds and labor data for contracts with state funds only. Details are available online through the department's Highway Construction Contractor Information (HCCI) site on the Labor, Wages, and EEO Information page at: https://wisconsindot.gov/Pages/doing-bus/civil-rights/labornwage/default.aspx

(2) Ensure that all tiers of subcontractors, including all trucking firms, either submit their weekly certified payroll reports (contracts with federal funds) or labor data (contracts with state funds only) electronically through CRCS or AWP CRL. These payrolls or labor data are due within seven calendar days following the close of the payroll period. Every firm providing physical labor towards completing the project is a subcontractor under this special provision.

(3) Upon receipt of contract execution, promptly make all affected firms aware of the requirements under this special provision and arrange for them to receive CRCS or AWP CRL training as they are about to begin their submittals. The department will provide training either in a classroom setting at one of our regional offices, via the online AWP Knowledge Base, or by telephone. to schedule CRCS specific training. The AWP Knowledge Base is at: https://awpkb.dot.wi.gov/

(4) The department will reject all paper submittals for information required under this special provision. All costs for conforming to this special provision are incidental to the contract.

(5) For firms wishing to export payroll/labor data from their computer system, have their payroll coordinator contact:

- For CRCS: Paul Ndon at paul.ndon@dot.wi.gov. Information about exporting payroll/labor data. Not every contractor's payroll system can produce export files. For details, see Section 4.8 CPR Auto Submit (Data Mapping) on pages 49-50; 66-71 of the CRCS Payroll Manual at: https://wisconsindot.gov/Documents/doing-bus/civil-rights/labornwage/crcs-payroll-manual.pdf
- For AWP CRL: Contact AWP Support at awpsupport@dot.wi.gov. Additional information can be found in the AWP Knowledge Base at https://awpkb.dot.wi.gov/Content/crl/Payrolls-PrimesAndSubs/PayrollXMLFileCreationProcess.htm

NON-DISCRIMINATION PROVISIONS

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. Compliance with Regulations: The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, Federal Highway Administration, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. Non-discrimination: The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. Information and Reports: The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the Federal Highway Administration to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the Federal Highway Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

5. Sanctions for Noncompliance: In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:

a. Withholding payments to the contractor under the contract until the contractor complies; and/or
b. Cancelling, terminating, or suspending a contract, in whole or in part.

6. Incorporation of Provisions: The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the Federal Highway Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

Pertinent Non-Discrimination Authorities:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d et seq., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21.
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 et seq.), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 et seq.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 et seq.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131-12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures Non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of Limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

BUY AMERICA PROVISION

Buy America (as documented in 88 FR 57750 (2 CFR part 184 and 200) from the Office of Management and Budget: Federal Register: Guidance for Grants and Agreements) shall be domestic products and permanently incorporated in this project as classified in the following three categories, and as noted in the Construction and Materials Manual (CMM):

1. Iron and Steel

   All iron and steel manufacturing and coating processes (from the initial melting stage through the application of coatings) must have occurred within the United States. Coating includes epoxy coating, galvanizing, painting and any other coating that protects or enhances the value of a material subject to the requirements of Buy America.

   The exemption of the iron and steel manufacturing and coating processes Buy America requirement is the minimal use of foreign materials if the total cost of such material permanently incorporated in the product does not exceed one-tenth of one percent (1/10 of 1%) of the total contract cost or $2,500.00, whichever is greater. For purposes of this paragraph, the cost is that shown to be the value of the subject products as they are delivered to the project.

2. Manufactured Product

   All manufactured products (as defined in CMM 228.5) are covered under a previous waiver from 1983 and are currently exempt from Buy America.

3. Construction Material

   All construction materials (as defined in 88 FR 57750 (2 CFR part 184 and 200) and as referenced in CMM 228.5) must comply with Buy America. All manufacturing process of construction materials must occur in the United States.

88 FR 55817 (DOT-OST-2022-0124) allows a limited waiver of Buy America requirements for de minimis costs and small grants.

- The Total value of the non-compliant products is no more than the lesser of $1,000,000 or 5% of total applicable costs for the project[1]; or
- The total amount of Federal financial assistance applied to the project, through awards or subaward, is below $500,000[2]

The contractor shall take actions and provide documentation conforming to CMM 228.5 to ensure compliance with this Buy America provision.

https://wisconsindot.gov/rdwy/cmm/cm-02-28.pdf

Upon completion of the project, certify to the engineer, in writing using department form DT4567 that all iron and steel, manufactured products, and construction materials conform to this Buy America provision.

Form DT4567 is available at: https://wisconsindot.gov/Documents/formdocs/dt4567.docx

Attach a list of iron or steel and construction material exemptions and their associated costs to the certification form using the Buy America Exemption Tracking Tool, available at:

https://wisconsindot.gov/hccidocs/contracting-info/buy-america-exemption-tracking-tool.xlsx

1 The de minimis public interest waiver does not apply to iron and steel subject to the requirements of 23 U.S.C. 313 on financial assistant administered by FHWA. The de minimis threshold in 23 CFR 635.410(b)(4) continues to apply for iron and steel.
2 The small grant portion of the waiver does not apply to iron, steel, and manufactured goods subject to the requirements of 49 U.S.C. 22905(a).

Proposal ID: 20250610010 **Project(s):** 1130-65-88

Federal ID(s): N/A

SECTION: 0001 Contract Items

Alt Set ID: **Alt Mbr ID:**

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price	Bid Amount
0002	205.0100 Excavation Common	66,607.000 CY	_____.____	_____.____
0004	213.0100 Finishing Roadway (project) 01. 1130-65-88	1.000 EACH	_____.____	_____.____
0006	305.0110 Base Aggregate Dense 3/4-Inch	98.000 TON	_____.____	_____.____
0008	305.0120 Base Aggregate Dense 1 1/4-Inch	7,886.000 TON	_____.____	_____.____
0010	312.0110 Select Crushed Material	8,886.000 TON	_____.____	_____.____
0012	455.0605 Tack Coat	192.000 GAL	_____.____	_____.____
0014	465.0105 Asphaltic Surface	1,070.000 TON	_____.____	_____.____
0016	606.0100 Riprap Light	2.100 CY	_____.____	_____.____
0018	608.6008 Storm Sewer Pipe Composite 8-Inch	285.000 LF	_____.____	_____.____
0020	608.6010 Storm Sewer Pipe Composite 10-Inch	254.000 LF	_____.____	_____.____
0022	612.0206 Pipe Underdrain Unperforated 6-Inch	153.000 LF	_____.____	_____.____
0024	612.0406 Pipe Underdrain Wrapped 6-Inch	462.000 LF	_____.____	_____.____
0026	612.0806 Apron Endwalls for Underdrain Reinforced Concrete 6-Inch	3.000 EACH	_____.____	_____.____
0028	618.0100 Maintenance and Repair of Haul Roads (project) 01. 1130-65-88	1.000 EACH	_____.____	_____.____
0030	619.1000 Mobilization	1.000 EACH	_____.____	_____.____

Proposal ID: 20250610010 **Project(s):** 1130-65-88

Federal ID(s): N/A

SECTION: 0001 Contract Items

Alt Set ID: **Alt Mbr ID:**

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price	Bid Amount
0032	624.0100 Water	76.000 MGAL	_____.____	_____.____
0034	625.0500 Salvaged Topsoil	7,890.000 SY	_____.____	_____.____
0036	628.1504 Silt Fence	375.000 LF	_____.____	_____.____
0038	628.1520 Silt Fence Maintenance	750.000 LF	_____.____	_____.____
0040	628.1905 Mobilizations Erosion Control	2.000 EACH	_____.____	_____.____
0042	628.1910 Mobilizations Emergency Erosion Control	2.000 EACH	_____.____	_____.____
0044	628.2004 Erosion Mat Class I Type B	13,255.000 SY	_____.____	_____.____
0046	628.7504 Temporary Ditch Checks	111.000 LF	_____.____	_____.____
0048	628.7560 Tracking Pads	1.000 EACH	_____.____	_____.____
0050	628.7570 Rock Bags	15.000 EACH	_____.____	_____.____
0052	629.0210 Fertilizer Type B	6.000 CWT	_____.____	_____.____
0054	630.0130 Seeding Mixture No. 30	415.000 LB	_____.____	_____.____
0056	630.0200 Seeding Temporary	471.000 LB	_____.____	_____.____
0058	630.0300 Seeding Borrow Pit	325.000 LB	_____.____	_____.____
0060	630.0500 Seed Water	388.000 MGAL	_____.____	_____.____
0062	643.0900 Traffic Control Signs	1,782.000 DAY	_____.____	_____.____

Proposal ID: 20250610010 **Project(s):** 1130-65-88

Federal ID(s): N/A

SECTION: 0001 Contract Items

Alt Set ID: **Alt Mbr ID:**

Proposal Line Number	Item ID Description	Approximate Quantity and Units	Unit Price	Bid Amount
0064	643.5000 Traffic Control	1.000 EACH	_____.____	_____.____
0066	645.0130 Geotextile Type R	21.000 SY	_____.____	_____.____
0068	690.0150 Sawing Asphalt	375.000 LF	_____.____	_____.____
0070	SPV.0035 Special 01. Drainage Blanket	3,750.000 CY	_____.____	_____.____
0072	SPV.0060 Special 01. Construction Staking Survey Project 1130-65-88	1.000 EACH	_____.____	_____.____
0074	SPV.0060 Special 02. Precast Concrete Salt Storage Building	1.000 EACH	_____.____	_____.____
0076	SPV.0060 Special 03. Settlement Gauges	5.000 EACH	_____.____	_____.____
0078	SPV.0060 Special 04. Vibrating Wire Piezometer Instrumentation System	1.000 EACH	_____.____	_____.____
0080	SPV.0090 Special 01. Fence Temporary 6-Foot	300.000 LF	_____.____	_____.____
0082	SPV.0090 Special 02. Prefabricated Vertical Drains	53,000.000 LF	_____.____	_____.____
0084	SPV.0090 Special 03. Prebored Prefabricated Vertical Drains	159,000.000 LF	_____.____	_____.____

Section: 0001 **Total:** _____.____

Total Bid: _____.____

PLEASE ATTACH ADDENDA HERE