HIGHWAY WORK PROPOSAL

Proposal Number: Ø 1

Wisconsin Department of Transportation
DT1502 10/2010 s.66.29(7) Wis. Stats.

COUNTY	STATE PROJECT ID	FEDERAL PROJECT ID	PROJECT DESCRIPTION	HIGHWAY
Rock	1001-03-74	WISC 2013 260	City of Janesville STH 11 N Jct Interchange	IH 39
Dane	1001-10-71		Illinois State Line - Madison SW Region Project Field Office	IH 39/90

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, $ 340,000.00 Payable to: Wisconsin Department of Transportation	Attach Proposal Guaranty on back of this PAGE.
Bid Submittal Due Date: May 14, 2013 Time (Local Time): 9:00 AM	Firm Name, Address, City, State, Zip Code **SAMPLE** **NOT FOR BIDDING PURPOSES**
Contract Completion Time November 22, 2013	
Assigned Disadvantaged Business Enterprise Goal 4 %	This contract is subject to 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)

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

(Date Commission Expires)

Notary Seal

(Bidder Signature)

(Print or Type Bidder Name)

(Bidder Title)

For Department Use Only

Type of Work Grading, borrow, base aggregate, concrete pavement, HMA pavement, Structures B-53-329, S-53-63, S-53-64, S-53-65, S-53-66 and S-53-67, culvert pipe, storm sewer, concrete curb and gutter, concrete sidewalk, beam guard, permanent signing, pavement marking, lighting and signals, plantings, building renovation, plumbing, electrical, heating and ventilation.	
Notice of Award Dated	Date Guaranty Returned

PLEASE ATTACH
PROPOSAL GUARANTY HERE

Effective with November 2007 Letting

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.

Effective with August 2007 Letting

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 http://www.dot.wisconsin.gov/business/engrserv/bid-letting-information.htm. 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 P.M. local time on the Thursday before the letting. Check the department's web site after 5:00 P.M. 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 P.M. 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 http://www.dot.wisconsin.gov/business/engrserv/bid-letting-information.htm or by calling the department at (608) 266-1631. Addenda can ONLY be obtained from the departments web site listed above or by picking up the addenda at the Bureau of Highway Construction, Room 601, 4802 Sheboygan Avenue, Madison, WI, during regular business hours.

B Submitting Electronic Bids

B.1 On the Internet

(1) Do the following before submitting the bid:

1. Have a properly executed annual bid bond on file with the department.
2. 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 **http://www.dot.wisconsin.gov/business/engrserv/bid-letting-information.htm**. 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.

C 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)

FEBRUARY 1999

LIST OF SUBCONTRACTORS

Section 66.29(7), Wisconsin Statutes, provides that a bidder, as a part of his proposal, shall submit a list of the subcontractors he proposes to contract with and the class of work to be performed by each, provided that to qualify for such listing each subcontractor must first submit his bid in writing to the general contractor at least 48 hours prior to the time of bid closing. It further provides that a proposal of a bidder shall not be invalid if any subcontractor, and the class of work to be performed by such subcontractor, has been omitted from a proposal.

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
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

DECEMBER 2000

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.

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SPECIAL PROVISIONS

1. General.

Perform the work under this construction contract for Project 1001-03-74; City of Janesville, STH 11 N. Jct. Interchange, IH 39, Rock County, Wisconsin and Project 1001-10-71, Illinois State Line – Madison, SW Region Project Field Office, IH 39, Dane 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, 2013 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 (20120615)

2. Scope of Work.

The work under this contract shall consist of grading, borrow, base aggregate, concrete pavement, HMA pavement, Structures B-53-329, S-53-63, S-53-64, S-53-65, S-53-66 and S-53-67, culvert pipe, storm sewer, concrete curb and gutter, concrete sidewalk, beam guard, permanent signing, pavement marking, lighting, ITS, signals, plantings, building, renovation, plumbing, electrical, heating and ventilation and all incidental items necessary to complete the work as shown on the plans and included in the proposal and contract.
104-005 (20090901)

3. Mandatory Pre-Bid Meeting.

Supplement standard spec 102.3.1 with the following:

Prospective bidders are required to attend a mandatory pre-bid meeting at 9:00 AM on April 15, 2013 at the IH 39/90 Field Office at 111 Interstate Blvd, Edgerton, WI.

The purpose of this meeting is to provide access to view the existing Project Field Office building. No meeting minutes will be prepared. Issues discovered at the meeting will be handled by addendum.
102-010 (20041504)

4. Prosecution and Progress.

Begin work within ten 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 10 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.

The contract time for completion is based on an expedited work schedule and may require extraordinary forces and equipment. Included in this "Prosecution and Progress" special provision are interim and final completion dates. These dates indicate that work efforts will possibly require multiple or concurrent controlling operations to occur at the same time. This information is included to assist the contractor and its subcontractors and shall not be interpreted as a demonstration of specified means and methods or work periods other than intermediate and completion dates.

The contractor is advised that there may be multiple mobilizations for such items as erosion control, traffic control, detours, signing items, temporary pavement markings and other incidental items related to the staging. The department will make no additional payment for said mobilizations.

IH-39/90 and STH 11 are oversize-overweight (OSOW) routes. Maintain access for all OSOW movements during all stages of construction.

Conform the schedule of operations to the construction staging as shown in the traffic control plans and as described herein unless modifications to the schedule are approved in writing by the engineer.

Stage 1

- Place temporary pavement on outside of STH 11 and ramps for Stage 2.
- Install temporary signals for Stage 2.

Stage 1A

- Place temporary pavement in median of STH 11.
- Install temporary signals for Stage 2.

Stage 2

- Reconstruct STH 11 eastbound lanes and portion of westbound lanes, including roundabouts and ITS items.
- Reconstruct ramps on south side of interchange.
- Construct bridge.

Stage 3

- Remove remaining portions of existing STH 11.
- Reconstruct STH 11 westbound lanes from southbound ramp terminal to Palmer Drive.
- Reconstruct inside lane of STH 11 westbound from Midland Road to northbound ramp terminal.
- Reconstruct ramps on north side of interchange. Gap the existing ramps to maintain traffic.
- Place permanent traffic signals at the intersection of STH 11 and Midland Road.
- Remove temporary pavement and restore to original condition.

Stage 3A

- Complete inside lane of STH 11 westbound from Midland Road to northbound ramp terminal.
- Continue remaining Stage 3 work.

Stage 3B

- Complete gapped portion of ramps on the north side of interchange.
- Complete connections to existing ramps.

Stage 4

- Reconstruct outside lane of STH 11 westbound from Midland Road to northbound ramp terminal.
- Complete remaining sections of median, curb and gutter and sidewalk.
- Remove existing ramps on the north side of the interchange.
- Remove existing bridges.
- Place permanent traffic signals at the intersection of E. Racine Street and Palmer Drive.
- Remove all temporary traffic signals.
- Remove any remaining temporary pavement and restore to original condition.

Do not switch traffic over to the next construction stage until all signing, pavement marking, reflectors, tubular marker posts, and traffic control drums for the stage are in place, temporary signals for the stage are in place and operational, and conflicting pavement markings and signs are removed as shown in the traffic control and temporary signal plans and as directed by the engineer. Allowable exceptions to this specification are crossover and intersection areas where traffic control cannot be placed until the switch is made.

Staged Electrical Work
This project will require special attention to coordinating electrical work with staged construction activities. Some notable aspects include:

- Installation of street lighting electrical service CB100 (City of Janesville street lighting) will be required by the start of stage 2. This electrical service location is assumed to be used for the southbound IH 39/90 temporary traffic signal.
- Installation and operation of street lighting system L-0871 will be required by the start of stage 3B to provide illumination of the roundabouts.

A construction permit has been granted by the City of Janesville for grading operations within the Blackhawk Golf Course. The construction operations shall be performed in such a manner as to provide minimum disturbance to the property. This area is not to be used for equipment or material storage, staging operations or any other operations not pertinent to the grading of the property. Maintain the golf course access at all times during construction. Restore the area as directed by the engineer and as described in the Erosion Control article of these special provisions.

Contractor Coordination
The prime contractor shall have a superintendent or designated representative on the job site during all controlling work operations, including periods limited to only subcontractor work operations, to serve as a primary contact person and to coordinate all work operations.

Hold progress meetings once a week for Project 1001-03-74. The contractor's superintendent or designated representative and subcontractor's representatives for ongoing subcontract work or subcontractor work expected to begin within the next two weeks are to attend and provide a written schedule of the next week(s)' operations. Include begin and end dates of specific prime and subcontractor work operations including lane closures and traffic switches. Invite utilities, City of Janesville, City of Janesville Transit and Rock County Sheriff representatives to attend the progress meetings. Agenda items at the meeting will include review of the contractor's schedule and subcontractors' schedule, utility conflicts and relocation schedule, evaluation of progress and pay items, and making revisions if necessary. Plans and specifications for upcoming work will be reviewed to prevent potential problems or conflicts between contractors.

Based on the progress meeting, if the engineer requests a new revised schedule, submit it within seven calendar days. Failure to submit a new schedule within seven days shall result in the engineer holding pay requests until received.

Hold progress meetings once a week for Project 1001-10-71. These meetings will take place at 111 Interstate Blvd, Edgerton, WI. The contractor's designated representative and subcontractor's representatives for ongoing subcontract work or subcontractor work expected to begin within the next two weeks are to attend and provide a written schedule of the next week(s)' operations. The meeting shall include the architect, engineer and at least one member of the IH 39/90 Corridor Management Team.

Existing Intelligent Transportation System (ITS) equipment at the I-39/90 and Racine Street Interchange is to be salvaged by the contractor:

- Salvage ITS Field Cabinet
- Salvage IP Radio
- Salvage Camera Assembly
- Salvage Video Encoder
- Salvage Type 5 Pole
- Salvage Transformer Base
- Salvage Mounted Controller Microwave Detector Assembly

ITS equipment salvaged from the I-39/90 and Racine Street Interchange is to be held on site for pick-up by WisDOT SW Region personnel. Contact Graham Heitz of the WisDOT SW Region at (608) 246-5362 at least 48 hours prior to salvaging in-place ITS equipment. Proper coordination will allow WisDOT personnel to pick-up salvaged materials with minimal field storage time. Proper coordination will also allow WisDOT personnel to make arrangements for the placement of a supplemental temporary camera trailer at the I-39/90 and Racine Street Interchange, as the time between existing camera removal and new camera installation is expected to be a number of months.

Salvaged equipment awaiting pick-up is to be stored outside roadway clear zones. Do not leave salvaged electronics exposed to the elements prior to pick-up by WisDOT personnel.

Damage occurring to salvaged equipment during the removal process or between the time of removal and WisDOT pick-up is the responsibility of the contractor. Equipment damaged during the removal process or between the time of removal and WisDOT pick-up will be repaired or the equipment will be replaced at the expense of the contractor.

Work Restrictions

Do not close traffic lanes on I-39/90, STH 11 or E. Racine Street outside the allowed time periods specified in the Traffic article of these special provisions.

Do not install or remove bridge deck falsework over live lanes of traffic. See the Traffic article of these special provisions for the allowed lane closure time periods.

Fifteen minute rolling stop closures will be allowed on I-39/90 for four nights between 11:00 PM and 5:00 AM, Monday PM through Friday AM for the placement of girders.

Two 15 minute rolling stop closures will be allowed on I-39/90 for the sign bridge take down and erection between 11:00 PM and 5:00 AM, Monday PM through Friday AM.

I-39/90 will be allowed to be closed for four night closures for the removal of the existing STH 11/E. Racine Street bridges between 11:00 PM and 5:00 AM, Monday PM through Friday AM.

Rolling stop closures and lane closures for final pavement marking are not allowed on any holidays.

Interim Completion of Work
Modify standard spec 108.11 as follows:

No lanes on IH 39/90 shall be closed prior to or after the specified times provided in this article. If the contractor closes lanes of traffic prior to or fails to open lanes of traffic by the specified times, then a reduction based upon 15 minute increments will be assessed to the contractor. The total reductions assessed to the contractor will be cumulative based on an escalating scale of 15 minute increments and will be the summation of separate reductions for each traffic lane and each direction of traffic in violation.

Time Period in excess of specified time	Reduction per lane of traffic and per direction of traffic	Cumulative reduction of traffic and per direction of traffic
1st 15 minutes	$1,500	$1,500
2nd 15 minutes	$3,000	$4,500
3rd 15 minutes	$4,500	$9,000
4th 15 minutes	$6,000	$15,000

If the contractor fails to open lanes of traffic after 60 minutes from the specified times, a constant reduction of $6,000 for each additional 15 minute increment, for each lane and each direction of traffic, will be assessed until lanes are open to traffic.

The total reduction from monies due to the contractor shall be the summation of the separate reductions for each work restriction violation. The department will administer reduction assessments for the road not being open to traffic under the Failing to Open Road to Traffic administrative item.

If the contractor fails to open all lanes of I-39/90, STH 11 or E. Racine Street within the specified timeframe, the department will assess the contractor interim liquidated damages as specified above.

If the contractor fails to reopen I-39/90 after the rolling stops described above, the department will assess the contractor interim liquidated as specified above.

If the contractor fails to reopen I-39/90 after the night closure described above, the department will assess the contractor interim liquidated damages as specified above.

The I-39/90 northbound exit loop ramp and I-39/90 southbound entrance loop ramp shall be open to traffic during the duration of the project except for the contractor will be allowed to close the I-39/90 northbound exit loop ramp and I-39/90 southbound entrance loop ramp for 10 calendar days for the completion of the new I-39/90 northbound entrance ramp and I-39/90 southbound exit ramp.

Supplement standard spec 108.11 as follows:

If the contractor fails to open the new I-39/90 northbound entrance ramp and I-39/90 southbound exit ramp after 10 calendar days the department will assess the contractor $5000 in interim liquidated damages per each calendar day that the ramps remain closed.

Complete renovation work on the Field Office building to substantial completion, allowing occupancy of the entire building by the department's staff prior to 12:01 AM October 25, 2013. Substantial completion is defined such that the progress of the work is sufficiently complete for WisDOT staff to move in, occupy, and use the fully operational facility, receive equipment training and develop the final punch list. The substantial completion date is also the date of commencement of applicable warranties required by the contract documents.

Supplement standard spec 108.11 as follows:
If the contractor fails to complete the renovation work on the Field Office building necessary for substantial completion prior to 12:01 AM October 25, 2013, the department will assess the contractor $1010 in interim liquidated damages for each calendar day that the building remains unfinished after 12:01 AM, October 25, 2013. An entire calendar day will be charged for any period of time within a calendar day that the building remains unfinished beyond 12:01 AM.

The department will not grant time extensions for the following:
1. Severe weather as specified in standard spec 108.10.2.2.
2. Labor disputes that are not industry wide.
3. Delays in material deliveries.

If contract time expires prior to completing all work specified in the contract, additional liquidated damages will be affixed in accordance to standard spec 108.11.

5. Traffic.

General
The following is a general overview of the traffic control and staging required throughout all stages of the project. The staging requirements are described further in the "Prosecution and Progress" article in these special provisions.

Accomplish the construction sequence, including the associated traffic control as detailed in the Construction Staging section of the plans, and as described in this Traffic article.

Unless detailed in the plans, do not begin or continue any work that closes traffic lanes outside the allowed time periods specified in this article.

Submit a detailed traffic control plan to the engineer for approval if different than the traffic control plan provided in the plan set. Submit this plan ten days prior to the pre-construction conference.

Submit all traffic control change requests to the engineer at least 3 working days prior to an actual traffic control change. A request does not constitute approval.

I-39/90, STH 11 and E. Racine Street will remain open to through traffic at all times for the duration of this project except where noted below and in the Prosecution and Progress article of these special provisions.

Traffic operations during all stages

- Maintain two lanes of traffic in each direction at all times on I-39/90**.
- Maintain one lane of traffic in each direction at all times on STH 11 and E. Racine Street**.
- Maintain traffic on ramps at all times**.
- Maintain one lane of traffic in each direction for all sideroads.
- Maintain left turn bays at intersections as shown on the plans**.
- Maintain mainline traffic on I-39/90, STH 11 and E. Racine Street on a paved concrete or hot mix asphalt surface at all times.
- Maintain a minimum lane width of 12-feet on I-39/90 (16-foot minimum clear width when restricted to one lane), ramps, STH 11, E. Racine Street and a minimum lane width of 10-feet on all other roads.

*** Lane closures allowed as specified in the Lane Closures section.*

Traffic operations during Stage 1

I-39/90 and Ramps

Traffic will be maintained on all existing lanes.

STH 11 and E. Racine Street

Traffic will be maintained on the inside lane of westbound.
Traffic will be maintained on all existing lanes of eastbound.

Traffic operations during Stage 1A

I-39/90 and Ramps

Traffic will be maintained on all existing lanes.

STH 11 and E. Racine Street

Traffic will be maintained on one lane of traffic in each direction.

Traffic operations during Stage 2

I-39/90

Traffic will be maintained on all existing lanes except closures as specified in Sections Lane Closures and Roadway Closures.

I-39/90 Ramps

Traffic will be maintained on the existing lanes and temporary roadway on the north side of the interchange.

STH 11 and E. Racine Street

One lane of traffic in each direction will be maintained on the existing westbound lanes and temporary pavement.

Traffic operations during Stage 3

I-39/90

Traffic will be maintained on all existing lanes.

I-39/90 Ramps

Traffic will be maintained on the existing lanes and temporary roadway on the north side of the interchange.

STH 11 and E. Racine Street

-One lane of traffic in each direction will be maintained on the newly constructed eastbound lanes from the southbound ramp terminal to Palmer Drive.

-Westbound traffic will be maintained on the inside lane of the newly constructed westbound lanes between the temporary ramp terminals and on the existing lane and temporary pavement from the northbound ramp terminal to Midland Road.

-Eastbound traffic will be maintained on the outside lane of the newly constructed eastbound lanes from the southbound ramp terminal to Midland Road.

Traffic operations during Stage 3A

I-39/90

Traffic will be maintained on all existing lanes.

I-39/90 Ramps

Traffic will be maintained on the existing lanes and temporary roadway on the north side of the interchange.

STH 11 and E. Racine Street

-One lane of traffic in each direction will be maintained on the newly constructed eastbound lanes from the southbound ramp terminal to Palmer Drive.

-Westbound traffic will be maintained on the inside lane of the newly constructed westbound lanes from the southbound ramp terminal to Midland Road.

-Eastbound traffic will be maintained on the outside lane of the newly constructed eastbound lanes from the southbound ramp terminal to Midland Road.

Traffic operations during Stage 3B

I-39/90

Traffic will be maintained on all existing lanes except closures as specified in Sections Lane Closures and Roadway Closures.

I-39/90 Ramps

Traffic will be maintained on the existing lanes and temporary roadway on the north side of the interchange and on the newly constructed ramps on the south side of the interchange.

STH 11 and E. Racine Street

-One lane of traffic in each direction will be maintained on the newly constructed eastbound lanes from the southbound ramp terminal to Palmer Drive.

-Westbound traffic will be maintained on the inside lane of the newly constructed westbound lanes from the southbound ramp terminal to Midland Road.

-Eastbound traffic will be maintained on the outside lane of the newly constructed eastbound lanes from the southbound ramp terminal to Midland Road.

Traffic operations during Stage 4

I-39/90

Traffic will be maintained on all existing lanes except closures as specified in sections Lane Closures and Roadway Closures.

I-39/90 Ramps

Traffic will be maintained on the newly constructed ramps.

STH 11 and E. Racine Street

Two lanes of traffic in each direction will be maintained on the newly constructed lanes except as needed to close one lane of traffic to complete median work.

Coordinate and stage all construction activities within the areas of local traffic routes, as required to maintain a traveled way conforming to all above requirements.

Use drums and barricades to direct local vehicular and pedestrian traffic in the work zone and to protect and delineate hazards such as open excavations, abrupt drop-offs, and exposed manholes, inlets, hydrants, etc. The use of such devices shall be incidental to the operation which creates the hazard.

Place roadway and sidewalk signing and roadway temporary pavement marking as detailed on the plans and in conformance to the Manual on Uniform Traffic Control Devices (MUTCD), latest edition. Traffic control shall be completely in place by the end of the working day of a traffic switch.

Do not deliver or store materials and equipment within open travel lanes or open side roads during any stage of construction. Temporary lane closures and/or halting of traffic within open roadways and pedestrian paths require flaggers and will not be permitted during Peak Travel Periods.

Conduct operations in a manner that will cause the least interference to traffic and pedestrian movements. Maintain vehicle and pedestrian access at all times to buildings within the limits of construction.

Do not at any time conduct construction operations in the median area and adjacent outside terrace area of I-39/90 or STH 11/E. Racine Street at the same time without the permission of the engineer.

Obtain approval from the engineer for the location of any ingress or egress access points for construction vehicles during peak travel periods.

Definitions
The following definitions apply to this contract:

I-39/90

Night-Time Work Hours:

Single lane closure:	11:00 PM to 5:00 AM
Shoulder closure:	9:00 PM to 5:00 AM
Rolling stop closure:	11:00 PM to 5:00 AM

Lane Closures
Single lane and shoulder closures on I-39/90 may be permitted during Night-Time Hours for work required to complete the ramp connections and removals and the installation and removal of bridge falsework. During the times when one lane is allowed to be closed, a minimum clear width of 16 feet, including the adjacent shoulder, shall be maintained at all times. Times listed for lane closure restrictions include setup and breakdown of any equipment and traffic control devices.

Request approval from the engineer for all lane closures in accordance to the "Wisconsin Lane Closure System Advanced Notification" section of these special provisions. Include justification for the lane closure and the anticipated duration in the request. A request does not constitute approval. Terminate single lane closures at the beginning of peak travel periods. Failure to obtain approval or reopen closed lanes at the required time shall be subject to penalties specified under the article "Prosecution and Progress".

Shoulders may be closed if required by the work operation, but the right and left shoulder may not be closed in the same area at the same time.

All lane and shoulder closures shall be removed when work is not in progress.

Provide arrow boards for use during all single lane closures in accordance to the MUTCD. Arrow boards for single lane closures will be paid for under the item Traffic Control Arrow Boards for each day with a single lane closure where an arrow board is in use.

Roadway Closures
Maintain full access at all intersections and ramps, as shown in the Construction Staging section of the plans except as follows:

During girder placement operations arrange for 15 minute rolling stop closures to be utilized for 4 nights. During the sign bridge take down and re-erection, arrange for two 15 minute rolling stops to be utilized. This will involve stopping freeway traffic for a brief

period and then allowing it to proceed behind a line of state patrol cars that will coordinate the procession with the construction crew at the site. The time for these stoppages shall be restricted to between 11:00 PM and 5:00 AM, Monday PM through Friday AM, with the exception of holiday work restrictions.

During removal of the existing bridges arrange for four night closures to be utilized. This will involve detouring the I-39/90 traffic as specified in the plans. Additional law enforcement will be required at the STH 11 ramp terminals during the detours. The time for the detour shall be restricted to between 11:00 PM and 5:00 AM, Monday PM through Friday AM, with the exception of holiday work restrictions.

Contractor operations shall not require state patrol cars to stop IH 39 traffic for more than the time described above. The department will allow this procedure for no more than the time specified above. The necessary flag persons, advanced signing and law enforcement personnel are required to be on site prior to and during this operation. Make arrangements for implementing the rolling stops and closures on I-39/90 through Jeff Gustafson at the Southwest Region Madison Office at (608) 516-6400, with the Southwest Region Office of the Wisconsin State Patrol and the Dane County Sheriff's department at least 10 days prior to any stoppage.

Failure to reopen the roadway at the required times shall be subject to penalties specified under the article "Prosecution and Progress".

Place Traffic Control Signs Portable Changeable Message for all lane and roadway closures as shown on the plans at least seven days prior to the lane or roadway closure. Install all signing and devices for detour routes. Obtain approval from the department for all messages for the Traffic Control Signs Portable Changeable Message. The engineer shall contact Jeff Gustafson at the Southwest Region Madison Office, (608) 516-6400. All lane closures are subject to the approval of the Region traffic engineer.

Local Traffic Access to Project
Maintain local traffic access to during the construction of STH 11 and E. Racine Street. Stage construction activities as required to maintain local traffic access.

Construct and maintain a local traffic access route on any section of roadway that will carry only local traffic conforming to the following criteria:

- Number of Lanes: One lane in each direction.
- Lane Width: Minimum of 10 foot width OR one lane roadway with flagging.
- Driving Surface: Acceptable driving surfaces include asphaltic surface temporary, HMA pavement, concrete pavement.

Pedestrian Access
Maintain sidewalk at all times except under direction of the engineer. In areas of sidewalk construction, provide a temporary surface for pedestrian access at all times. The temporary surface shall meet Americans with Disabilities Act Accessibility Guidelines

(ADAAG) requirements and shall consist of conveyor belt, temporary asphaltic surface, any grade of concrete, skid resistant steel plating, or alternative material as approved by the engineer. Gravel or base course material is not acceptable. Maintaining sidewalk is considered incidental to the contract.

Maintain pedestrian crosswalks at all times crossing STH 11 and E. Racine Street, as shown on the traffic control plans, unless otherwise directed by the engineer. Temporary crosswalks shall meet requirements of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) and shall consist of temporary asphaltic surface, any grade of concrete, skid resistant steel plating, or alternative material as approved by the engineer. Gravel or base course material is not acceptable. Maintain ADA accessible pedestrian walkways that are free from mud, sand, and construction debris. The Temporary Crosswalk Access bid item is payment for maintaining crosswalks through the construction zone.

Property Access

Maintain access to properties along the project for local residents, businesses, and emergency vehicles. Access to all driveways and parking lots where alternative access is not available shall remain open at all times, except when it is absolutely necessary to close them for underground construction. Concrete curb and gutter, concrete driveway, and concrete sidewalk construction shall be staged to maintain driveway access. Keep business entrances open by partial driveway construction or by closing only one access at a time for properties with multiple driveways. Construct temporary commercial entrances including a crushed aggregate surface within 24 hours of removal. Combine temporary commercial entrances wherever practical to minimize the number of access locations.

Inform all adjacent property owners two working days prior to closing their access(es). Maintaining property access as described above is considered incidental to the Traffic Control (Project) bid item.

Advance Notification

Notify the City of Janesville Police Department, Fire Department and Director of Public Works, Rock County Sheriff's Department and Highway Commissioner, Wisconsin State Patrol, Janesville Post Office and Janesville Gazette 48 hours in advance of the start of work, closures of existing streets, and prior to traffic control changes. Notifications must be given by 4:00 PM on Thursday for any such work to be done on the following Monday.

Notify Janesville Transit and Janesville School District two weeks prior to construction. Also notify them one week prior to traffic switches and lane closures.

Advance notification as described above is considered incidental to the Traffic Control (Project) bid item.

Clear Zone Working Restrictions
Do not leave any slopes steeper than 3:1 within the clear zone or any drop offs at the edge of the traveled way greater than 2 inches which are not protected by temporary precast barrier. The clear zone for I-39/90 is 34 feet and STH 11 and E. Racine Street is 20 feet.

Do not perform heavy equipment work in the median or adjacent to the shoulder at any time unless protected by concrete barrier in both directions except during night work with allowed lane closures.

Store materials or park equipment a minimum of 34-feet from the edge of the USH 12 traveled way. Equipment may be parked in the median if it is protected by concrete barrier.

If the contractor is unsure whether an individual work operation will meet the safety requirements for working within the clear zone, review the proposed work operation with the engineer before proceeding with the work.

Portable Changeable Message Signs – Message Prior Approval
After coordinating with department construction field staff, notify Jeff Gustafson at the Southwest Region Madison Office, (608) 516-6400, three weeks prior to deploying or changing a message on a PCMS to obtain approval of the proposed message. The department will review the proposed message and either approve the message or make necessary changes.

Wisconsin Lane Closure System Advanced Notification
Provide the following minimum advance notification to the engineer for incorporation into the Wisconsin Lane Closure System.

Requested Closure or Restriction	Calendar or Business Days
Project Start	14 calendar days
Lane closures (without width restriction)	3 business days
Lane closures (with width restriction)	14 calendar days
Construction stage changes	14 calendar days
Full Freeway closures	14 calendar days
Detours	14 calendar days
Local Street (side road) openings/closings	7 calendar days
Intersection cross-traffic closures	14 calendar days

Notify the engineer and WisDOT Statewide Traffic Operations Center, (414) 227-2142, if there are any changes in the schedule, early completions, or cancellations of scheduled work.

The department has the authority to disallow any requested closures or width restrictions.

Coordinate with the engineer prior to any traffic detour to allow at least ten working days for the review of the detour route marker signing. The engineer shall contact the Southwest Region Madison Office Traffic Management Coordinator, Jeff Gustafson, (608) 516-6400.

Portable Intelligent Transportation System
The department will be supplying and operating an intelligent transportation system during the construction of this project. The ITS system will consist of a portable video surveillance system and portable changeable message signs. These portable units will be parked inside and outside the construction limits to help assist law enforcement and the department with monitoring traffic conditions during the construction activities.

The department will coordinate the placement of these devices with the contractor. The contractor will be required to accommodate the placement of these devices within the project. The general accommodations include an area to park the devices out of the clear zone but still visible to traffic and access to and from the devices. Contact the Southwest Region Traffic Section, Graham Heitz at (608) 246-5362 for specific details regarding the intelligent transportation system.

Protection of Bridge Pier Columns
Bridge pier columns are to remain protected at all times throughout construction.

Construction Access
Restrict work on IH 39/90 within closed shoulders as allowed by the plans or engineer. Provide and utilize temporary deceleration and acceleration lanes to/from the work zones. Construction of the temporary lanes shall be incidental to other items of work. All construction access is subject to approval of the engineer.

During the period when lane closures are not allowed on IH 39/90, access into the work zones from IH 39/90 must be made with a deceleration lane. The length of the deceleration lane is subject to review and approval by the engineer to ensure work zone traffic is exiting safely from IH 39/90. Construction traffic from the work zone entering live traffic on IH 39/90 must use an acceleration lane with a minimum length of 1000-feet. The acceleration lane entrance to IH 39/90 cannot be placed within 1500-feet of an interchange ramp.

Construction traffic cannot travel counter-directional adjacent to I-39/90 traffic except behind temporary concrete barrier.

General Access
U-Turns at existing maintenance crossovers or temporary crossovers between I-39/90 northbound and southbound will be allowed when lane closures are in place for inside northbound and southbound passing lanes.

Construction operations affecting the traveling public's safety on I-39/90 will not be allowed during snow and ice conditions, or any other adverse weather conditions, unless approved by the engineer.

Delivery of equipment to I-39/90 requiring the use of a semi tractor and trailer shall only occur during those hours identified as non-peak work periods.

6. Holiday Work Restrictions.

Do not perform work on, nor haul materials of any kind along or across any portion of the highway carrying IH 39 and STH 11 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 periods:

- From noon Wednesday July 3, 2013 to 6:00 AM Monday, July 8, 2013 for Independence Day;
- From noon Friday, August 30, 2013 to 6:00 AM Tuesday, September 3, 2013 for Labor Day;
- From noon Friday October 11, 2013 to 6:00 AM Monday October 14, 2013 for Columbus Day.

107-005 (20050502)

7. Utilities.

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

There are underground and overhead utility facilities located within the project limits. There are known utility adjustments required for the construction project as noted below. Coordinate construction activities with a call to Diggers Hotline or a direct call to the utilities that have facilities in the area as required per statutes. Use caution to ensure the integrity of underground facilities and maintain code clearance from overhead facilities at all times. Adjustments in the location of certain described items may be necessary, as directed by the engineer, when it becomes evident that a utility conflict could occur.

Prospective bidders are cautioned that the arrangements set forth in this Article represent the utility companies' best estimate of their plans to relocate and/or adjust conflicting facilities. Frequently, the utility companies encounter problems that prevent them from meeting their anticipated schedules. Bidders are advised to contact each utility company listed in the plans, prior to preparing their bids, to obtain current information on the status of any utility relocation work stated herein.

Work around or remove and dispose of any discontinued utility conduits, cables, and pipes encountered during excavation. Any removal and disposal shall be incidental to common excavation, unless specified otherwise in this contract as a separate bid item.

Some of the utility work described below is dependent on prior work being performed by the contractor at a specific site. In such situations, provide a good faith notice to both the engineer and the affected utility of when the utility is to start work at the site. Unless specified otherwise in this article, provide this notice 14 to 16 calendar days in advance of when you anticipate the prior work being completed and provide a confirmation notice to the engineer and the utility 3 to 5 working days before the site will be ready for the utility to begin its work.

Alliant Energy-Electric: Alliant Energy-Electric has underground electric facilities within the project limits at the following locations:

- BOP to Station 130+40'RE', RT.
- BOP to Station 128+75'RW', LT.
- STH 11/E. Racine Street westbound to I-39/90 northbound on-ramp to EOP, adjacent to the north right-of-way line.
- Numerous services lines.

Alliant Energy-Electric plans on adjusting the existing electric facility that crosses Park Place Lane at Station 43+00'PP' during construction. It is anticipated that this work will require one working day to complete. The contractor will have to coordinate with Alliant Energy-Electric to complete this work.

The field contact is Ron Rohm, 3730 Kennedy Road, Janesville, WI 53545, (608) 757-7514, mobile: (608) 751-7935, e-mail: ronaldrohm@alliantenergy.com.

Alliant Energy has an electric service supplying the Field Office building in Edgerton. No conflicts, outside the building, are expected to complete the building work. Any outages to the existing system within the building must be scheduled when the interruption causes the least interference with normal business hours.

Alliant Energy-Gas: Alliant Energy-Gas has underground gas facilities within the project limits at the following locations:

- BOP to E. Racine Street eastbound to I-39/90 southbound on-ramp, RT.
- Crossing at Station 129+30'RE'.
- NW quadrant of STH 11/E. Racine Street and Midland Road intersection.

Alliant Energy-Gas plans on adjusting the existing gas facility that crosses Racine Street at Station 129+30'RE' prior to construction.

The field contact is Ron Rohm, 3730 Kennedy Road, Janesville, WI 53545, (608) 757-7514, mobile: (608) 751-7935, e-mail: ronaldrohm@alliantenergy.com.

Alliant Energy has a natural gas service supplying the Field Office building in Edgerton. No conflicts, outside the building, are expected to complete the building work.

American Transmission Company (ATC) - Electric Transmission: ATC has overhead electric transmission lines within the project limits at the following locations:

- 69 kV overhead crossing at Station 743+75'RBT' and Station 743+50'RCT'.
- 69 kV overhead crossing at Station 163+50'RE'.

ATC plans on adjusting the existing electric facility between approximately Station 743+00'RBT' and Station 744+00'RBT' prior to construction. The existing anchored guys at approximately Station 159+75'RE' will remain in place. Caution should be used

while grading in the area of these anchors. Working clearances need to be maintained based on OSHA requirements.

The field contact is Rodger Ludlum, 5303 Fen Oak Drive, Madison, WI 53718, (608) 877-3516, mobile: (608) 622-9225, e-mail: rludlum@atcllc.com.

AT&T Wisconsin: AT&T Wisconsin has underground telephone and fiber optic facilities within the project limits at the following locations:

- Fiber Optic; BOP to E. Racine Street eastbound to I-39/90 southbound on-ramp, RT.
- Copper; BOP to E. Racine Street eastbound to I-39/90 southbound on-ramp, RT.
- Copper; BOP to Station 128+75'RW', LT.

AT&T Wisconsin does not anticipate any conflicts.

The field contact is Shane Levake, 301 E. Milwaukee Street, Janesville, WI 53545, (608) 755-5586, mobile: (608) 774-2289, e-mail: sl3184@att.com.

Charter Communications: Charter Communications has underground facilities within the project limits at the following locations:

- BOP to Station 130+00'RE', RT.
- BOP to Station 130+00'RW', LT.

Charter Communications plans on adjusting the existing underground facility from Station 117+50'RE' to Station 124+00'RE' and from Station 117+75'RW' to Station 123+50'RW' prior to construction.

The field contact is Randy Steurer, 1348 Plainfield Avenue, Janesville, WI 53545, (608) 373-7544, mobile: (608) 209-3194, e-mail: rsteurer@chartercom.com.

Frontier Communications of WI: Frontier Communications provides telephone and internet service to the Field Office building in Edgerton. No conflicts, outside the building, are expected to complete the building work

City of Janesville – Sanitary Sewer: City of Janesville has underground sanitary sewer facilities within the project limits at the following locations:

- BOP to Station 130+00'RW', LT.
- Crossing at Station 128+75'RE' and Station 165+10'RE'.

The sanitary manholes will be adjusted as part of this project.

The field contact is Dennis Ryan, 18 North Jackson Street, Janesville, WI 53547, (608) 755-3171, mobile: (608) 289-2146, e-mail: ryand@ci.janesville.wi.us.

City of Janesville – Signals: City of Janesville has existing traffic signals within the project limits at the following locations:

- Palmer Drive intersection.

Modifications to the existing facilities are included in this project. See project plans for details.

The field contact is Dennis Ryan, 18 North Jackson Street, Janesville, WI 53547, (608) 755-3171, mobile: (608) 289-2146, e-mail: ryand@ci.janesville.wi.us.

City of Janesville – Water: City of Janesville has underground water facilities within the project limits at the following locations:

- BOP to Station 130+00'RW', LT.
- Crossing at Station 117+40'RE', Station 128+65'RE' and Station 164+75'RE'.
- Station 163+70'RW' to EOP, LT.

The water valves and manholes will be adjusted as part of this project.

The field contact is Dennis Ryan, 18 North Jackson Street, Janesville, WI 53547, (608) 755-3171, mobile: (608) 289-2146, e-mail: ryand@ci.janesville.wi.us.

City of Edgerton – Water: City of Edgerton provides water service to the Field Office building in Edgerton. No conflicts, outside the building, are expected to complete the building work.

City of Edgerton – Sanitary Sewer: City of Edgerton provides sanitary sewer service to the Field Office building in Edgerton. No conflicts, outside the building, are expected to complete the building work

WisDOT Signals: WisDOT has existing traffic signals within the project limits at the following locations:

- Midland Drive intersection.

Modifications to the existing facilities are included in this project. See project plans for details.

WisDOT STOC: WisDOT has underground electric facilities within the project limits at the following locations:

- I-39/90 northbound to STH 11/E. Racine Street westbound off-ramp, adjacent to the inside shoulder.
- Crossing at the STH 11/E. Racine Street westbound to I-39/90 northbound on-ramp.

Modifications to the existing facilities are included in this project. See project plans for details.

8. Other Contracts.

Project 1005-10-70, Illinois State Line – Madison (CTH O – North Rock County Line) has an anticipated construction start date of June 2013 and is anticipated to have a completion date of November 2013 and is located within the limits of this project. The work under this contract will need to be coordinated with Project 1001-03-74.

9. Public Convenience and Safety.

Revise standard spec 107.8(6) as follows:

Check for and comply with local ordinances governing the hours of operation of construction equipment. Do not operate motorized construction equipment from 9:00 PM until the following 7:00 AM, unless prior written approval is obtained from the engineer.
107-001 (20060512)

10. Construction Over or Adjacent to Navigable Waters.

Supplement standard spec 107.19 with the following:

The Spring Brook is classified as a navigable waterway.
107-060 (20040415)

11. Erosion Control.

Supplement subsection 107.20 of the standard specifications as follows:
Perform construction operations in a timely and diligent manner, continuing all construction operations methodically from the initial topsoil stripping operation through the subsequent grading and finishing to minimize the period of exposure to erosion.

Immediately re-topsoil graded areas, as designated by the engineer, after grading is completed within those areas. Seed, fertilize, and mulch or erosion mat all topsoiled areas within five working days after placement of topsoil.

12. Notice to Contractor.

The City of Janesville is interested in obtaining any waste material from the project. The potential waste site is the City of Janesville Landfill located at 525 Black Bridge Road. Contact Dennis Ryan, City of Janesville at (608) 755-3171 for more information.

13. Notice to Contractor – Work by Others.

Transmission of video to the Statewide Traffic Operations Center (STOC) in Milwaukee will depend upon the utilization of a wireless mesh network to be installed by others under the 1003/1005/1007-10-70 project. The wireless mesh network will cover the I-39/90 construction corridor from north of Janesville to the Illinois state line at Beloit. Upon installation of the new CCTV camera pole at the I-39/90 and Racine Street Interchange,

coordinate with the 1003/1005/1007-10-70 contractor to allow placement of the wireless mesh network components on the new CCTV camera pole.

An electrical service to be located in the NE quadrant of the I-39/90 and Racine Street Interchange off the westbound Racine Street roundabout bypass to the north/westbound I-39/90 onramp will be shared between lighting and ITS. The electrical service will be paid for under lighting work.

14. Notice to Contractor, Notification of Demolition and/or Renovation No Asbestos Found.

James Gondek, License Number AII-108099, inspected Structure B-53-0031 and B-53-0032 for asbestos on December 5, 2005. No Regulated Asbestos Containing Material (RACM) was found on this structure. A copy of the inspection report is available from: Jennifer Grimes, WisDOT SW Region, (608) 246-3823.

In accordance to NR447 and DHS159, ensure that DNR or DHS receives a completed Notification of Demolition and/or Renovation (DNR Form 4500-113 (R 4/11), or subsequent revision) via U.S. mail, hand-delivery, or using the online notification system at least 10 working days prior to beginning any construction or demolition. Pay all associated fees. Provide a copy of the completed 4500-113 form to Jennifer Grimes, WisDOT SW Region, 2101 Wright Street, Madison, WI 53704 and DOT BTS-ESS attn: Hazardous Materials Specialist PO Box 7965, Madison, WI. 53707-7965. In addition, comply with all local or municipal asbestos requirements.

Use the following information to complete WisDNR form 4500-113:

- Site Name: Structure B-53-0031, STH 11 WB over IH 39/90
- Site Address: Lat: 42°40’16.89”N, Long: 88°58’59.39”W
  Section 32 Town 3N Range 13E City of Janesville
- Ownership Information: WisDOT Transportation SW Region, 2101 Wright Street, Madison, WI 53704-2583
- Contact: Wayne Chase
- Phone: (608) 246-3859
- Age: This structure was constructed in 1959, the deck was replaced in 1989.
- Area: 10488 SF of deck

Use the following information to complete WisDNR form 4500-113:

- Site Name: Structure B-53-0032, STH 11 EB over IH 39/90
- Site Address: Lat: 42°40’15.81”N, Long: 88°59’02.29”W
  Section 05 Town 2N Range 13E City of Janesville
- Ownership Information: WisDOT Transportation SW Region, 2101 Wright Street, Madison, WI 53704-2583
- Contact: Wayne Chase
- Phone: (608) 246-3859
- Age: This structure was constructed in 1959, the deck was replaced in 1989.
- Area: 10488 SF of deck

Insert the following paragraph in Section 6.g.:

- If asbestos not previously identified is found or previously non-friable asbestos becomes crumbled, pulverized, or reduced to a powder, stop work immediately, notify the engineer, and the engineer will notify the department's Bureau of Technical Services at (608) 266-1476 for an emergency response in accordance to standard spec 107.24. Keep material wet until it is abated or until it is determined to be non-asbestos containing material.

107-125 (20120615)

15. Electrical Work By Others.

Under project 1001-03-74, the Wisconsin Department of Transportation Southwest Region Electrical Unit will perform the following work for all WisDOT owned lighting and traffic signal systems:

-
- Submit application, authorization and payment for electrical service installation.
- Verify the location of all concrete bases.
- Verify the configuration and orientation of cabinet bases and adjacent pullboxes.
- Terminate all wires in the permanent traffic signal control cabinet.
- Provide all permanent traffic signal and temporary traffic signal programming.

Contact information for the Wisconsin Department of Transportation Southwest Region Electrical Unit: Dena Dramm, 2101 Wright Street, Madison, WI, (608) 246-5360.

16. Street Lighting and Traffic Signal Systems – General Information.

The street lighting and traffic signal work required under project 1001-03-74 consists of removal, partial reconstruction and new construction of both the City of Janesville and WisDOT Southwest Region systems. The systems included in this contract are as follows:

City of Janesville

- Partial reconstruction of the Racine Street and Palmer Drive traffic signal. The existing electrical service is located in northeast quadrant of the intersection, to be removed and relocated.
- Partial removal of the existing street lighting in the Racine Street median east of Palmer Drive. The existing electrical service is located in southeast quadrant of Racine Street and Palmer Drive intersection, to remain in use to feed lights east of Palmer Drive.
- New construction of a street lighting system in the Racine Street median between IH 39/90 and Palmer Drive. A new electrical service will be installed at station 130+50'RE', RT.
- Temporary traffic signal at the Racine Street and Palmer Drive intersection. A temporary electrical service is assumed to be required for temporary signal operation.

For the purposes of this contract the primary point of contact for the City of Janesville will be Dennis Ryan, 18 North Jackson Street, P.O. Box 5005, Janesville, WI 53547-5005, (608) 755-3171, ryand@ci.janesville.wi.us.

WisDOT Southwest Region

- Partial reconstruction of the STH 11 (Racine Street) and Midland Road traffic signal. The existing electrical service is located in northeast quadrant of the intersection, to be maintained.
- New construction of a street lighting system at the IH 39/90 ramp terminal roundabouts. A new electrical service will be installed at station 155+50'RE', LT.
- Temporary traffic signals at the intersections of STH 11 (Racine Street) and Midland Road, IH 39/90 northbound ramp and IH 39/90 southbound ramp. Temporary electrical services are assumed to be required for temporary signal operation.

For the purposes of this contract the primary point of contact for the WisDOT Southwest Region will be Dena Dramm, 2101 Wright Street, Madison, WI, (608) 246-5360, dena.dramm@dot.wi.gov.

Project Schedule

This project will require special attention to maintaining an aggressive schedule in order to complete work as required in the prosecution and progress article. Compile all material submittals within 2-weeks of contract award and provide to the engineer for review and approval. Approvals must be completed as early as possible to provide adequate lead time from material suppliers.

17. Project Communication Enhancement Effort.

Use the Project Communication Enhancement Effort (PCEE) tools on this contract. Coordinate with the department to modify the various published tools as necessary to meet the particular project needs and determine how to implement those tools under the contract. Ensure the full participation of the contractor and its principal subcontractors throughout the term of the contract.

Forms and associated guidance are published in the PCEE Manual available at the department's Highway Construction Contract Information (HCCI) web site at:

http://roadwaystandards.dot.wi.gov/standards/admin/pcee-user-manual.doc

18. Coordination with Businesses.

The contractor will arrange and conduct a meeting between the contractor, the department, local officials and business people to discuss the project schedule of operations including vehicular and pedestrian access during construction operations. Hold the first meeting prior to the start of work under this contract and hold two meetings per month thereafter.
108-060 (20030820)

19. Airport Operating Restrictions.

Obtain and complete Federal Aviation Administration (FAA) Form 7460-1. This form deals with height restriction requirements for work in the vicinity of the Southern Wisconsin Regional Airport located in the City of Janesville. The form is available on the FAA Web Site at http://www.oeaaa.faa.gov. Present approved copies of said form and required restrictions to the engineer prior to the beginning of crane operations. Submit all paperwork as soon as possible. No crane operations shall take place until the engineer receives approved paperwork. Contact Gary Dikkers, Airspace Specialist, Wisconsin Department of Transportation, Bureau of Aeronautics at (608) 267-5018 to address questions on Form 7460-1 and its requirements.

20. Intelligent Transportation Systems – Control of Materials.

Standard spec 106.2 – Supply Source and Quality
Supplement standard spec 106.2 with the following:

The department will furnish a portion of equipment to be installed by the contractor. This department-furnished equipment includes the following:

Department-Furnished Items
Combination ethernet switch and terminal server with fiber ports - single mode.
Cabinet, pole-mounted, cctv.
Camera, traffic, dome-style, outdoor.
Encoder, video mpeg 2/4 (hardened) 1-channel.
Pole, 50', freeway, with lowering system.

Coordinate delivery of department-furnished equipment with Graham Heitz of the WisDOT SW Region at (608) 246-5362.

Standard spec 106.3 – Approval of Materials
Supplement standard spec 106.3 with the following:

Design/Shop Drawings
Prior to the purchase and/or fabrication of any of the components listed herein, and for any non-catalog item shown on the Material and Equipment List specified above, and no

more than 30 days after notice to proceed, submit five copies of design drawings and shop drawings, as required, to the department for review. The items and the drawings that represent them shall meet the requirements of the standard specifications.

Design drawing submissions shall consist of signed and certified designs, design drawings, calculations, and material specifications for required items.

Shop drawings will be required for, but not limited to the following:

- Any contractor-designed structure or foundation.

The department will complete its review of the material within 30 days from the date of receipt of the submission, unless otherwise specified. The department will advise the contractor, in writing, as to the acceptability of the material submitted. The department may determine that if no exceptions were taken for the item, it is approved, and no further action is required by the contractor; or the item may be partially or totally rejected, in which case modify and/or amend the submittal as required by the department and resubmit the item within 14 days. At this time, the review and approval cycle described above will begin again.

21. Intelligent Transportation Systems – General Requirements.

A Description

A.1 General

This contract includes furnishing and installing elements for an Intelligent Transportation System in or along the roadway as shown on the plans.

Unusual aspects of this project include:

- The department will furnish some of the equipment to be installed. Make a reasonable effort to discover defects in that equipment prior to installation.

A.2 Surge Protection

Equip every ungrounded conductor wire entering or leaving any equipment cabinet with a surge protector. For purposes of this section, multiple cabinets on a single pole or foundation are considered a single cabinet.

B Materials

B.1 General

Only furnish equipment and component parts for this work that are new and have high quality workmanship. All controls, indicators, and connectors shall be clearly and permanently labeled in a manner approved by the engineer. All equipment of each type shall be identical.

All electrical equipment shall conform to the standards and requirements of the Wisconsin Electrical Code, the National Electrical Manufacturers Association (NEMA), National Electric Safety Council (NESC), Underwriter's Laboratory Inc. (UL) or the Electronic Industries Association (EIA), when applicable. All materials and workmanship

shall conform to the requirements of the National Electrical Code (NEC), Rural Electrification Administration (REA), Standards of the American Society for Testing and Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO), requirements of the plans these special provisions, the standard specifications, and to any other codes, standards, or ordinances that may apply. All system wiring, conduit, grounding hardware and circuit breakers shall be in conformance with the National Electrical Code. Whenever reference is made to any of the standards mentioned, the reference shall be considered to mean the code, ordinance, or standard that is in effect at the time of the bid advertisement.

B.2 Outdoor Equipment

All conductive connectors, pins (except pins connected by soldering), and socket contacts shall be gold plated. Acrylic conformal coating shall protect each circuit board side that has conductive traces. Except for integrated circuits containing custom firmware, all components shall be soldered to the printed circuit board.

To prevent galvanic corrosion, all connections between dissimilar metals shall incorporate a means of keeping moisture out of the connection. Where the connection need not conduct electricity, interpose a non-absorbing, inert material or washer between the dissimilar metals. Use nonconductive liners and washers to insulate fasteners from dissimilar metals. Where the connection must conduct electricity, use a conductive sealant between the dissimilar metals. Alternatively, use an insulating gasket and a bond wire connecting the two metal parts.

B.3 Custom Equipment

Equipment that is not part of the manufacturer's standard product line, or that is made or modified specifically for this project, shall conform to the following requirements:

- Where practical, electronics shall be modular plug-in assemblies to facilitate maintenance. Such assemblies shall be keyed to prevent incorrect insertion of modules into sockets.
- All components shall be available from multiple manufacturers as part of the manufacturers' standard product lines. All shall be clearly labeled with the value, part number, tolerance, or other information sufficient to enable a technician to order an exact replacement part.
- Lamps used for indicator purposes shall be light-emitting diodes.
- The printed circuit boards shall be composed of "two-ounce" copper on 1/16-inch thick fiberglass epoxy or equivalent type construction. Holes that carry electrical connections from one side of the boards to the other shall be completely plated through. Multilayer printed circuit boards shall not be used. The name or reference number used for the board in the drawings and maintenance manuals supplied to the department shall be permanently affixed to each board.
- All components shall be mounted so that the identifying markings are visible without moving or removing any part, if practical.

B.4 Environmental Conditions

Equipment shall continue to operate as specified under the following ranges of environmental conditions, except as noted in the specifications for individual pieces of equipment.

Vibration and Shock:

- Vehicle speed and classification sensors and any other equipment mounted atop poles or on structures shall not be impaired by the continuous vibration caused by winds (up to 90 mph with a 30 percent gust factor) and traffic.

Duty Cycle:

- Continuous

Electromagnetic Radiation:

- The equipment shall not be impaired by ambient electrical or magnetic fields, such as those caused by power lines, transformers, and motors. The equipment shall not radiate signals that adversely affect other equipment.

Electrical Power:

- Operating power: The equipment shall operate on 120-volts, 60-Hz, single-phase unless otherwise specified. It shall conform to its specified performance requirements when the input voltage varies from 89 to 135 volts and the frequency varies +3 Hz.
- High frequency interference: The equipment operation shall be unaffected by power supply voltage spikes of up to 150 volts in amplitude and 10 microseconds duration.
- Line voltage transients: The equipment operation shall be unaffected by voltage transients of plus or minus 20 percent of nominal line voltage for a maximum duration of 50 milliseconds. Equipment in the field shall meet the power service transient requirements of NEMA Standard TS-2 when connected to the surge protectors in the cabinets.

Temperature and Humidity:

- Field equipment: Equipment in the field shall meet the temperature and humidity requirements of NEMA Standard TS-2. Liquid crystal displays shall be undamaged by temperatures as high as 165 degrees F, and shall produce a usable display at temperatures up to 120 degrees F.
- Equipment in controlled environments shall operate normally at any combination of temperatures between 50 degrees F and 100 degrees F, and humidity between 5 percent and 90 percent, non-condensing, and with a temperature gradient of 9 degrees F per hour.

B.5 Patch Cables and Wiring

All cables and wiring between devices installed in a single cabinet, in separate cabinets sharing a single concrete base, and in a pole-mounted cabinet and equipment sharing the same pole will be considered incidental to the installation of the devices and no separate

payment will be made for them. It is anticipated that this will include Ethernet cables and power cables between individual devices and power sources within the cabinets.

B.6 Surge Protection

Low-voltage signal pairs, including twisted pair communication cable(s) entering each cabinet shall be protected by two-stage, plug-in surge protectors and shall be installed on both ends of camera control cables. The protectors shall meet or exceed the following minimum requirements:

- The protectors shall suppress a peak surge current of up to 10k amps.
- The protectors shall have a response time less than one nanosecond.
- The protector shall clamp the voltage between the two wires at a voltage that is no more than twice the peak signal voltage, and clamp the voltage between each wire and ground at 50 volts.
- The first stage of protection shall be a three-element gas discharge tube, and the second stage shall consist of silicon clamping devices.
- The protector shall also contain a resettable fuse (PTC) to protect against excessive current.
- There shall be no more than two pairs per protector.
- It shall be possible to replace the protector without using tools.

C Construction

C.1 Thread Protection

Provide rust, corrosion, and anti-seize protection at all thread assemblies of metallic parts by coating (non-spray) the mating surfaces with an approved compound. Failure to use an approved compound will result in no payment for the items to which coating was to have been applied.

C.2 Cable Installation

When installing new cables into conduits containing existing cables, remove the existing cables and reinstall the existing cables simultaneously with the new cables. Take every precaution necessary to protect the existing cables. In the event of avoidable damage to the existing cables, replace all damaged cables, in-kind, at no additional expense to the department. When cables are pulled into conduit, use a cable pulling lubricant approved by the cable manufacturer. Submit documentation supporting manufacturer approval of the lubricant to the engineer.

C.3 Wiring

Every conductor, except a conductor contained entirely within a single piece of equipment, shall terminate either in a connector or on a terminal block. Provide and install the connectors and terminal blocks where needed, without separate payment. Use approved splice kits instead of connectors and terminal blocks for underground power cable splices.

Permanently label and key connectors to preclude improper connection. Obtain prior engineer approval for the labeling method(s) prior to use.

Terminal blocks shall be affixed to panels that permanently identify the block and what wire connects to each terminal. This may be accomplished by silk screening or by installing a laminated printed card under the terminal block, with the labels on portions of the card that extend beyond the block. Installation of terminal blocks by drilling holes in the exterior wall of the cabinet is not acceptable.

Use barriers to protect personnel from accidental contact with all dangerous voltages.

Do not install conductors carrying AC power in the same wiring harness as conductors carrying control or communication signals.

Arrange wiring, including fiber optic pigtails, so that any removable assembly can be removed without disturbing wiring that is not associated with the assembly being removed.

Communication and control cables may not be spliced underground, except where indicated on the plans.

C.4 System Operations
An expected ITS service interruption will occur on this project. However, if the contractor's operations unexpectedly interrupt ITS service, notify the engineer immediately and restore service within 24 hours. Repair all damaged facilities to the condition existing before the interruption. If service is not restored within 24 hours, the department may restore service to any operating device and deduct restoration costs from payments due to the contractor.

C.5 Surge Protection
Arrange the equipment and cabinet wiring to minimize the distance between each conductor's point of entry and its protector. Locate the protector as far as possible from electronic equipment. Ensure that all wiring between the surge protectors and the point of entry is free from sharp bends.

D Measurement
No separate measurement will be made for the work described in this article.

E Payment
No separate payment will be made for the work described in this article. All work described in this article shall be included under the ITS items in the contract.

22. Maintaining Drainage.

Maintain drainage at and through worksite during construction in accordance to standard spec 107.22, standard spec 204, and standard spec 520.

Use existing inlets, existing storm sewer, temporary inlets, temporary storm sewer pipe, and bypass drainage to maintain existing subsurface drainage.

If dewatering or pumping is required, the pumped water shall be filtered through a media such as washed stone or allowed to settle in a sediment basin constructed as detailed in the plans prior to release into a live stream. The discharge should be dissipated as to not scour any surface area. This operation is incidental to the task requiring dewatering, including, but not limited to; pipe, inlet and manhole removal; pipe, inlet and manhole installation; and temporary pipe and inlet installation and removal.

23. CPM Progress Schedule.

Complete CPM Progress Schedule in accordance to standard spec 108.4 and herein provided:

Replace standard spec 108.4.4.3(1)(7) with the following:

(7) Provide 3-week look-ahead bar charts by early start.

Add the following to standard spec 108.4.4.4:

(4) Three-Week Look-Ahead Schedules
Between each monthly CPM Progress Schedule update, submit Three-Week Look-Ahead Schedules on a weekly basis after the notice to proceed. The Three-Week Look-Ahead schedules can be hand drawn or generated by computer. With each Three-Week Look-Ahead include:

1. Activities underway and as-built dates for the past week.

2. Planned work for the upcoming two-week period.

3. The activities of the Three-Week Look-Ahead schedule shall include the activities underway and critical RFIs and submittals, based on the CPM schedule. The Three-Week Look-Ahead may also include details on other activities not individually represented in the CPM schedule.

4. On a weekly basis, the department and the contractor shall agree on the as-built dates depicted in the Three-Week Look-Ahead schedule or document any disagreements. Use the as-built dates from the Three-Week Look-Ahead schedules for the month when updating the CPM schedule.

Replace standard spec 108.4.4.7(1) with the following:

(1) The department will measure CPM Progress Schedule for each initial and monthly schedule update acceptably completed.

Replace standard spec 108.4.4.8(2) with the following:

(2) Payment is full compensation for furnishing all work required under this bid item. The department will pay the bid item price for the initial schedule and each monthly schedule update submitted to the department. The Three-Week Look-Ahead schedules are incidental to the monthly CPM Progress Schedule updates.

24. Embankment Construction.

Replace standard spec 205.3.2(4) with the following:

If placing embankment on side slopes 10-feet high or higher and steeper than one vertical to 3 horizontal, cut a minimum 2 foot horizontal bench into the existing embankment every 2 feet of vertical fill height.

25. QMP Base Aggregate.

A Description

A.1 General

(1) This special provision describes contractor quality control (QC) sampling and testing for base aggregates, documenting those test results, and documenting related production and placement process changes. This special provision also describes department quality verification (QV), independent assurance (IA), and dispute resolution.

(2) Conform to standard spec 301, 305, and 310 as modified here in this special provision. Apply this special provision to material placed under all of the Base Aggregate Dense and Base Aggregate Open Graded bid items, except do not apply this special provision to material classified as reclaimed asphaltic pavement placed under the Base Aggregate Dense bid items.

(3) Do not apply this special provision to material placed under the Aggregate Detours, Salvaged Asphaltic Pavement Base, Breaker Run, Select Crushed, Pit Run, Subbase, or Riprap bid items.

(4) Provide and maintain a quality control program, defined as all activities related to and documentation of the following:

1. Production and placement control and inspection.
2. Material sampling and testing.

(5) Chapter 8 of the department's construction and materials manual (CMM) provides additional detailed guidance for QMP work and describes required sampling and testing procedures. The contractor may obtain the CMM from the department's web site at:

http://roadwaystandards.dot.wi.gov/standards/cmm/index.htm

A.2 Contractor Testing for Small Quantities

(1) The department defines a small quantity, for each individual Base Aggregate bid item, as a plan quantity of 9000 tons or less of material as shown in the schedule of items under that bid item.

(2) The requirements under this special provision apply equally to a small quantity for an individual bid item except as follows:

1. The contractor need not submit a full quality control plan but shall provide an organizational chart to the engineer including names, telephone numbers, and current certifications of all persons involved in the quality control program for material under affected bid items.
2. Divide the aggregate into uniformly sized sublots for testing as follows:

Plan Quantity	Minimum Required Testing
≤ 1500 tons	One test from production, load-out, or placement at the contractor's option[1]
> 1500 tons and ≤ 6000 tons	Two tests of the same type, either from production, load-out, or placement at the contractor's option[1]
> 6000 tons and ≤ 9000 tons	Three placement tests[1] [3]

[1] If using production tests for acceptance, submit test results to the engineer for review prior to incorporating the material into the work. Production test results are valid for a period of 3 years.

[2] For 3-inch material, obtain samples at load-out.

[3] If the actual quantity overruns 9000 tons, create overrun sublots to test at a rate of one additional placement test for each 3000 tons, or fraction of 3000 tons, of overrun.

3. No control charts are required. Submit aggregate load-out and placement test results to the engineer within one business day of obtaining the sample. Assure that all properties are within the limits specified for each test.
4. Department verification testing is optional for quantities of 6000 tons or less.

(3) Material represented by a sublot with any property outside the specification limits is nonconforming. The department may reject material or otherwise determine the final disposition of nonconforming material as specified in standard spec 106.5.

B Materials

B.1 Quality Control Plan

(1) Submit a comprehensive written quality control plan to the engineer at or before the pre-construction meeting. Do not place base before the engineer reviews and comments on the plan. Construct the project as that plan provides.

(2) Do not change the quality control plan without the engineer's review. Update the plan with changes as they become effective. Provide a current copy of the plan to the engineer and post in each of the contractor's laboratories as changes are adopted. Ensure that the plan provides the following elements:

1. An organizational chart with names, telephone numbers, current certifications and/or titles, and roles and responsibilities of QC personnel.
2. The process used to disseminate QC information and corrective action efforts to the appropriate persons. Include a list of recipients, the communication means that will be used, and action time frames.
3. A list of source and processing locations, section and quarter descriptions, for all aggregate materials requiring QC testing.
4. Test results for wear, sodium sulfate soundness, freeze/thaw soundness, and plasticity index of all aggregates requiring QC testing. Obtain this information from the region materials unit or from the engineer.
5. Descriptions of stockpiling and hauling methods.
6. Locations of the QC laboratory, retained sample storage, and where control charts and other documentation is posted.
7. An outline for resolving a process control problem. Include responsible personnel, required documentation, and appropriate communication steps.

B.2 Personnel

(1) Have personnel certified under the department's highway technician certification program (HTCP) perform sampling, testing, and documentation as follows:

Required Certification Level:	**Sampling or Testing Roles:**
Aggregate Technician IPP Aggregate Sampling Technician Aggregate Assistant Certified Technician (ACT-AGG)	Aggregate Sampling[1]
Aggregate Technician IPP Aggregate Assistant Certified Technician (ACT-AGG)	Aggregate Gradation Testing, Aggregate Fractured Particle Testing, Aggregate Liquid Limit and Plasticity Index Testing

[1] Plant personnel under the direct observation of an aggregate technician certified at level one or higher may operate equipment to obtain samples.

(2) A certified technician must coordinate and take responsibility for the work an ACT performs. Have a certified technician ensure that all sampling and testing is performed correctly, analyze test results, and post resulting data. No more than one ACT can work under a single certified technician.

B.3 Laboratory

(1) Perform QC testing at a department-qualified laboratory. Obtain information on the Wisconsin laboratory qualification program from:

Materials Management Section
3502 Kinsman Boulevard
Madison, WI 53704
Telephone: (608) 246-5388
http://www.dot.state.wi.us/business/engrserv/lab-qualification.htm

B.4 Quality Control Documentation

B.4.1 General

(1) Submit base aggregate placement documentation to the engineer within 10 business days after completing base placement. Ensure that the submittal is complete, neatly organized, and includes applicable project records and control charts.

B.4.2 Records

(1) Document all placement observations, inspection records, and control adjustments daily in a permanent field record. Also include all test results in the project records. Provide test results to the engineer within 6 hours after obtaining a sample. For 3-inch base, extend this 6-hour limit to 24 hours. Post or distribute tabulated results using a method mutually agreeable to the engineer and contractor.

B.4.3 Control Charts

(1) Plot gradation and fracture on the appropriate control chart as soon as test results are available. Format control charts according to CMM 8.30. Include the project number on base placement control charts. Maintain separate control charts for each base aggregate size, source or classification, and type.

(2) Provide control charts to the engineer within 6 hours after obtaining a sample. For 3-inch base, extend this 6-hour limit to 24 hours. Post or distribute charts using a method mutually agreeable to the engineer and contractor. Update control charts daily to include the following:

1. Contractor individual QC tests.
2. Department QV tests.
3. Department IA tests.
4. Four-point running average of the QC tests.

(3) Except as specified under B.8.2.1 for nonconforming QV tests, include only QC tests in the running average. The contractor may plot process control or informational tests on control charts, but do not include these tests, conforming QV tests, or IA tests in the running average.

B.5 Contractor Testing

(1) Test gradation, fracture, liquid limit and plasticity index during placement for each base aggregate size, source or classification, and type.

(2) Test gradation once per 3000 tons of material placed. Determine random sample locations and provide those sample locations to the engineer. Obtain samples after the material has been bladed, mixed, and shaped but before compacting; except collect 3-inch samples from the stockpile at load-out. Do not sample from material used to maintain local traffic or from areas of temporary base that will not have an overlying pavement. On days when placing only material used to maintain local traffic or only temporary base that will not have an overlying pavement, no placement testing is required.

(3) Split each contractor QC sample and identify it according to CMM 8.30. Retain the split for 7 calendar days in a dry, protected location. If requested for department comparison testing, deliver the split to the engineer within one business day.

(4) The engineer may require additional sampling and testing to evaluate suspect material or the technician's sampling and testing procedures.

(5) Test fracture for each gradation test until the fracture running average is above the lower warning limit. Subsequently, the contractor may reduce the frequency to one test per 10 gradation tests if the fracture running average remains above the warning limit.

(6) Test the liquid limit and plasticity index for the first gradation test. Subsequently, test the liquid limit and plasticity index a minimum of once per 10 gradation tests.

B.6 Test Methods

B.6.1 Gradation

(1) Test gradation using a washed analysis conforming to the following as modified in CMM 8.60:

Gradation	AASHTO T 27
Material finer than the No. 200 sieve	AASHTO T 11

(2) For 3-inch base, if 3 consecutive running average points for the percent passing the No. 200 sieve are 8.5 percent or less, the contractor may use an unwashed analysis. Wash at least one sample out of 10. If a single running average for the percent passing the No. 200 sieve exceeds 8.5 percent, resume washed analyses until 3 consecutive running average points are again 8.5 percent passing or less.

(3) Maintain a separate control chart for each sieve size specified in standard spec 305 or 310 for each base aggregate size, source or classification, and type. Set control and warning limits based on the standard specification gradation limits as follows:

1. Control limits are at the upper and lower specification limits.
2. There are no upper warning limits for sieves allowing 100 percent passing and no lower control limits for sieves allowing 0 percent passing.
3. Dense graded warning limits, except for the No. 200 sieve, are 2 percent within the upper and lower control limits. Warning limits for the No. 200 sieve are set 0.5 percent within the upper and lower control limits.
4. Open graded warning limits for the 1-inch, 3/8-inch, and No. 4 sieves are 2 percent within the upper and lower control limits. Upper warning limits for the No. 10, No. 40, and No. 200 sieves are 1 percent inside the upper control limit.

B.6.2 Fracture

(1) Test fracture conforming to CMM 8.60. The engineer will waive fractured particle testing on quarried stone.

(2) Maintain a separate fracture control chart for each base aggregate size, source or classification, and type. Set the lower control limit at the contract specification limit, either specified in another special provision or in table 301-2 of standard spec 301.2.4.5. Set the lower warning limit 2 percent above the lower control limit. There are no upper limits.

B.6.3 Liquid Limit and Plasticity

(1) Test the liquid limit and plasticity according to AASHTO T 89 and T 90.

(2) Ensure the material conforms to the limits specified in standard spec table 301-2.

B.7 Corrective Action

B.7.1 General

(1) Consider corrective action when the running average trends toward a warning limit. Take corrective action if an individual test exceeds the contract specification limit. Document all corrective actions both in the project records and on the appropriate control chart.

B.7.2 Placement Corrective Action

(1) Do not blend additional material on the roadbed to correct gradation problems.

(2) Notify the engineer whenever the running average exceeds a warning limit. When 2 consecutive running averages exceed a warning limit, the engineer and contractor will discuss appropriate corrective action. Perform the engineer's recommended corrective action and increase the testing frequency as follows:

1. For gradation, increase the QC testing frequency to at least one randomly sampled test per 1000 tons placed.
2. For fracture, increase the QC testing frequency to at least one test per gradation test.

(3) If corrective action improves the property in question such that the running average after 4 additional tests is within the warning limits, the contractor may return to the testing frequency specified in B.5.3. If corrective action does not improve the property in question such that the running average after 4 additional individual tests is still in the warning band, repeat the steps outlined above starting with engineer notification.

(4) If the running average exceeds a control limit, material starting from the first running average exceeding the control limit and ending at the first subsequent running average inside the control limit is nonconforming and subject to pay reduction.

(5) For individual test results significantly outside the control limits, notify the engineer, stop placing base, and suspend other activities that may affect the area in question. The engineer and contractor will jointly review data, data reduction, and data analysis; evaluate sampling and testing procedures; and perform additional testing as required to determine the extent of potentially unacceptable material. The engineer may

direct the contractor to remove and replace that material. Individual test results are significantly outside the control limits if meeting one or more of the following criteria:

1. A gradation control limit for the No. 200 sieve is exceeded by more than 3.0 percent.
2. A gradation control limit for any sieve, except the No. 200, is exceeded by more than 5.0 percent.
3. The fracture control limit is exceeded by more than 10.0 percent.

B.8 Department Testing

B.8.1 General

(1) The department will conduct verification testing to validate the quality of the product and independent assurance testing to evaluate the sampling and testing. The department will provide the contractor with a listing of names and telephone numbers of all QV and IA personnel for the project, and provide test results to the contractor within 2 business days after the department obtains the sample.

B.8.2 Verification Testing

B.8.2.1 General

(1) The department will have an HTCP technician, or ACT working under a certified technician, perform QV sampling and testing. Department verification testing personnel must meet the same certification level requirements specified in B.2 for contractor testing personnel for each test result being verified. The department will notify the contractor before sampling so the contractor can observe QV sampling.

(2) The department will conduct QV tests of each base aggregate size, source or classification, and type during placement conforming to the following:

1. One non-random test on the first day of placement.
2. At least one random test per 30,000 tons, or fraction of 30,000 tons, placed.

(3) The department will sample randomly, at locations independent of the contractor's QC work, collecting one sample at each QV location. The department will collect QV samples after the material has been bladed, mixed, and shaped but before compacting; except, for 3-inch aggregates, the department will collect samples from the stockpile at load-out. The department will split each sample, test half for QV, and retain half.

(4) The department will conduct QV tests in a separate laboratory and with separate equipment from the contractor's QC tests. The department will use the same methods specified for QC testing.

(5) The department will assess QV results by comparing to the appropriate specification limits. If QV test results conform to the specification, the department will take no further action. If QV test results are nonconforming, add the QV to the QC test results as if it were an additional QC test.

B.8.3 Independent Assurance

(1) Independence assurance is unbiased testing the department performs to evaluate the department's QV and the contractor's QC sampling and testing including personnel qualifications, procedures, and equipment. The department will perform an IA review according to the department's independent assurance program. That review may include one or more of the following:

1. Split sample testing.
2. Proficiency sample testing.
3. Witnessing sampling and testing.
4. Test equipment calibration checks.
5. Reviewing required worksheets and control charts.
6. Requesting that testing personnel perform additional sampling and testing.

(2) If the department identifies a deficiency, and after further investigation confirms it, correct that deficiency. If the contractor does not correct or fails to cooperate in resolving identified deficiencies, the engineer may suspend placement until action is taken. Resolve disputes as specified in B.9.

B.9 Dispute Resolution

(1) The engineer and contractor should make every effort to avoid conflict. If a dispute between some aspect of the contractor's and the engineer's testing program does occur, seek a solution mutually agreeable to the project personnel. The department and contractor may review the data, examine data reduction and analysis methods, evaluate sampling and testing procedures, and perform additional testing. Use ASTM E 178 to evaluate potential statistically outlying data.

(2) Production test results, and results from other process control testing, may be considered when resolving a dispute.

(3) If the project personnel cannot resolve a dispute, and the dispute affects payment or could result in incorporating non-conforming product, the department will use third party testing to resolve the dispute. The department's central office laboratory, or a mutually agreed on independent testing laboratory, will provide this testing. The engineer and contractor will abide by the results of the third party tests. The party in error will pay service charges incurred for testing by an independent laboratory. The department may use third party test results to evaluate the quality of questionable materials and determine the appropriate payment. The department may reject material or otherwise determine the final disposition of nonconforming material as specified in standard spec 106.5.

C (Vacant)

D (Vacant)

E Payment

(1) Costs for all sampling, testing, and documentation required under this special provision are incidental to this work. If the contractor fails to perform the work required

under this special provision, the department may reduce the contractor's pay. The department will administer pay reduction under the non-performance of QMP administrative item.

(2) For material represented by a running average exceeding a control limit, the department will reduce pay by 10 percent of the contract price for the affected Base Aggregate bid items listed in subsection A. The department will administer pay reduction under the Nonconforming QMP Base Aggregate Gradation or Nonconforming QMP Base Aggregate Fracture Administrative items. The department will determine the quantity of nonconforming material as specified in B.7.2.
301-010 (20100709)

26. Base Aggregate Dense 1 1/4-Inch.

Replace standard spec 305.2.2.1(2) with the following:

- Use 1 ¼-Inch base aggregate that conforms to the following gradation requirements.

Percentage by weight passing Percentage of Mass Passing	
1 1/4 inch	95 - 100
1 inch	---
3/4 inch	70 - 90
3/8 inch	45 - 75
No. 4	30 - 60
No. 10	20 - 40
No. 40	7 - 25
No. 200	2 - 12 [1], [3]

[1] Limited to a maximum of eight percent for base placed between old and new pavement.

[3] 3 - 10 percent passing when base is ≥ 50% crushed gravel

27. HMA Pavement.

This special provision describes specialized material requirements for HMA Pavements. Conform to standard spec 460, as modified in this special provision.

MODIFY THE STANDARD SPECIFICATIONS AS FOLLOWS:

406.2.7 HMA Mixture Design
Replace Table 460-2 Mixture Requirements with the following:

Mixture type	E - 0.3	E - 1	E - 3	E - 10	E - 30	E - 30x	SMA
ESALs x 10^6 (20 yr design life)	< 0.3	0.3 - < 1	1 - < 3	3 - < 10	10 - < 30	>= 30	____
LA Wear (AASHTO T96)							
100 revolutions (max % loss)	13	13	13	13	13	13	13
500 revolutions (max % loss)	40	40	40	40	40	40	40
Soundness (AASHTO T104) (sodium sulfate, max % loss)	9.0	9.0	9.0	9.0	9.0	9.0	9.0
Freeze/Thaw (AASHTO T103) (specified counties, max % loss)	12	12	12	12	12	12	12
Fractured Faces (ASTM 5821) (one face/2 face, % by count)	60 /	65 /	75 / 60	85 / 80	98 / 90	100/100	100/90
Flat & Elongated (ASTM D4791) (max %, by weight)	5 (5:1 ratio)	5 (5:1 ratio)	5 (5:1 ratio)	5 (5:1 ratio)	5 (5:1 ratio)	5 (5:1 ratio)	20 (3:1 ratio)
Fine Aggregate Angularity (AASHTO T304, method A, min)	40	40	43	45	45	45	45
Sand Equivalency (AASHTO T176, min)	40	40	40	45	45	50	50
Gyratory Compaction							
Gyrations for N_{ini}	6	7	7	8	8	9	8
Gyrations for N_{des}	40	60	75	100	100	125	65
Gyrations for N_{max}	60	75	115	160	160	205	160
Air Voids, $\%V_a$ ($\%G_{mm}$ N_{des})	4.0 (96.0)	4.0 (96.0)	4.0 (96.0)	4.0 (96.0)	4.0 (96.0)	4.0 (96.0)	4.0 (96.0)
% G_{mm} N_{ini}	<= 91.5[1]	<= 90.5[1]	<= 89.0[1]	<= 89.0	<= 89.0	<= 89.0	____
% G_{mm} N_{max}	<= 98.0	<= 98.0	<= 98.0	<= 98.0	<= 98.0	<= 98.0	____
Dust to Binder Ratio[2] (% passing 0.075/P_{be})	0.6 - 1.2	0.6 - 1.2	0.6 - 1.2	0.6 - 1.2	0.6 - 1.2	0.6 - 1.2	1.2 - 2.0
Voids filled with Binder (VFB or VFA, %)	70 - 80 [4] [5]	65 - 78[4]	65 - 75[4]	65 - 75[3] [4]	65 - 75[3] [4]	65 - 75[3] [4]	70 - 80
Tensile Strength Ratio (TSR) (ASTM 4867)							
no antistripping additive	0.70	0.70	0.70	0.70	0.70	0.70	0.70
with antistripping additive	0.75	0.75	0.75	0.75	0.75	0.75	0.75
Draindown at Production Temperature (%)							0.30

[1] The percent maximum density at initial compaction is only a guideline.

[2] For a gradation that passes below the boundaries of the caution zone (ref. AASHTO MP3), the dust to binder ratio limits are 0.6 - 1.6.

[3] For 9.5mm nominal maximum size mixtures, the specified VFB range is 73 - 76%.

[4] For 37.5mm nominal maximum size mixes, the specified VFB lower limit is 67%.

[5] For 25.0mm nominal maximum size mixes, the specified VFB lower limit is 67%.

28. Debris Containment Structure B-53-31, Item 203.0225.S.001; Debris Containment Structure B-53-32, Item 203.0225.S.002.

A Description
This special provision describes providing a containment system to prevent debris from structure removal, or other construction operations from falling onto facilities located under the structure. Using this containment system does not relieve the contractor of requirements under standard spec 107.17 and standard spec 107.19 or requirements under an US Army Corps of Engineers Section 404 Permit.

B (Vacant)

C Construction
Prior to starting work, submit a debris containment plan to the engineer for review. Incorporate engineer-requested modifications. Do not start work over IH-39/90 until the engineer approves the debris containment plan.

Maintain adequate protection throughout construction for people and property within the potential fall zone. Ensure that a containment system capable of protecting underlying facilities from falling construction debris is in place before beginning deck removal, parapet removal, or other operations that may generate debris.

D Measurement
The department will measure Debris Containment Structure B-53-31 and B-53-32 as a single lump sum unit of work for each structure, acceptably completed.

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

ITEM NUMBER	DESCRIPTION	UNIT
203.0225.S.001	Debris Containment Structure B-53-31	LS
203.0225.S.002	Debris Containment Structure B-53-32	LS

Payment is full compensation for furnishing, installing, maintaining, and removing a debris containment system.
203-010 (20080902)

29. Temporary Shoring, Item 206.6000.S.

A Description
This special provision describes designing and providing temporary shoring at locations the plans show.

B Materials

B.1 Shoring Design

Provide a shoring design for each location where the plan requires temporary shoring. Have a professional engineer, registered in the State of Wisconsin and knowledgeable of the specific site conditions and requirements, verify the adequacy of the design. Submit one copy of each shoring design, signed and sealed by the same professional engineer verifying the design, to the engineer for incorporation into the permanent project record.

C Construction

Provide temporary shoring at each required location conforming to the design developed for that location.

Remove the shoring when it is no longer needed unless the engineer allows it to remain in place. Backfill the space that is excavated but not occupied by the new permanent construction conforming to standard spec 206.3.13.

D Measurement

The department will measure Temporary Shoring by the square foot acceptably completed at locations the plans show, measured as the area of exposed face in the plane of the shoring from the ground line in front of the shoring to a maximum of one foot above the retained grade. Shoring used for staged construction in multiple configurations without removal and reinstallation will be measured once based on the configuration with the largest area of exposed face.

E Payment

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

ITEM NUMBER	DESCRIPTION	UNIT
206.6000.S	Temporary Shoring	SF

Payment is full compensation for designing and providing shoring; for providing a signed and sealed copy of the design; and for backfilling and removing the shoring.

The department will not pay for temporary shoring, installed for contractor convenience, that is not required in the plans.

206-005 (20110615)

30. Concrete Pavement.

This special provision describes specialized material requirements for aggregates used in Concrete Pavements. Conform to standard spec 415 and standard spec 501, as modified in this special provision. Conform to standard spec 715 for QMP Concrete Pavement and Structures.

MODIFY THE STANDARD SPECIFICATIONS AS FOLLOWS:

501.2.5.4.1 General
Replace the entire text with the following:

(1) Use clean, hard, durable crushed limestone with 100% fractured surfaces and free of an excess of thin or elongated pieces, frozen lumps, vegetation, deleterious substances or adherent coatings considered injurious.

(2) Use virgin aggregates only.

501.2.5.4.2 Deleterious Substances
Replace paragraph one with the following:

(1) The amount of deleterious substances must not exceed the following percentages:

DELETERIOUS SUBSTANCE	PERCENT BY WEIGHT
Shale	1.0
Coal	1.0
Clay lumps	0.3
Soft fragments	5.0
Any combination of above	5.0
Thin or elongated pieces based on a 3:1 ratio	15.0
Materials passing the No. 200 sieve	1.5
Chert[1]	2.0

[1]Material classified lithologically as chert and having a bulk specific gravity (saturated surface-dry basis) of less than 2.45. Determine the percentage of chert by dividing the weight of chert in the sample retained on a 3/8-inch sieve by the weight of the total sample.

501.2.5.4.3 Physical Properties
Replace paragraph one with the following:

(1) The department will ensure that Los Angeles wear testing conforms to AASHTO T 96, soundness testing conforms to AASHTO T 104 using 5 cycles in sodium sulfate solution on aggregate retained on the No. 4 sieve, and freeze-thaw soundness testing conforms to AASHTO T 103. The percent wear must not exceed 40, the weighted soundness loss must not exceed 9 percent, and the weighted freeze-thaw average loss must not exceed 12 percent.

31. Concrete Staining B-53-329, Item 517.1010.S.01.

A Description
Furnish and apply a two coat concrete stain to the exposed concrete surfaces of the structure, as detailed in the plans and as hereinafter provided.

B Materials

B.1 Mortar

Use mortar for sack rubbing the concrete surfaces as given in standard spec 502.3.7.5 or use one of the following products:

Preblended, Packaged Type II Cement:	Tri-Mix by TK Products
	Thoroseal Pearl Gray by Thoro Products

The mortar shall contain one of the following acrylic bonding admixtures mixed and applied in accordance to manufacturer's recommendations:

Acrylic Bonding Admixture:	TK-225 by TK Products
	Achro 60 by Thoro Products
	Achro Set by Master Builders

B.2 Concrete Stain

Use concrete stain manufactured for use on exterior concrete surfaces, consisting of a base coat and a pigmented sealer finish coat. Use the following products, or equal as approved by the department, as part of the two coat finish system:

Tri-Sheen Concrete Surfacer, Smooth by TK Products
Tri-Sheen Acrylic by TK Products
TK-1450 Natural Look Urethane Anti-Graffiti Primers by TK Products
Safe-Cure and Seal EPX by Chem Masters
H + C Shield Plus by Sherwin-Williams

C Construction

C.1 General

Furnish, prepare, apply, cure, and store all materials in accordance to the product manufacturer's specifications for the type and condition of application required.

Match or exceed the stain manufacturer's minimum recommended curing time of the concrete or 28 days, whichever is greater, prior to staining.

C.2 Preparation of Concrete Surfaces

Provide a sack rubbed finish in accordance to standard spec 502.3.7.5, using mortar as indicated above on concrete surfaces with open voids or honeycombing.

Following the sack rubbing, clean all concrete surfaces that are to be coated to ensure that the surface is free of all laitance, dirt, dust, grease, efflorescence, and any foreign material and that the surface will accept the coating material according to product requirements. As a minimum, clean the surface using a 3000-psi water blast. Hold the nozzle of the water blaster approximately 6 inches from the concrete surface and move it continuously in a sweeping motion. Give special attention to smooth concrete surfaces to produce an acceptable surface texture. Correct any surface problems resulting from the surface preparation methods. Grit blasting of the concrete surface is not allowed.

C.3 Staining Concrete Surfaces
Apply the concrete stain in accordance to the manufacturer's recommendations.

Apply the concrete stain when the temperature of the concrete surface is 45º F or higher, or as given by the manufacturer.

The color of the stain shall be as given on the plan. Tint the base coat to match the finish coat; the two coats shall be compatible with each other.

Do not begin staining the structure until earthwork operations are completed to a point where this work can begin without receiving damage. Where this work is adjacent to exposed soil or pavement areas, provide temporary covering protection from overspray or splatter.

C.4 Test Areas
Prior to applying stain to the structure, apply the stain to sample panels measuring a minimum of 48-inches x 48-inches and constructed to demonstrate workmanship in the use of the form liner specified on the structure if applicable. Match or exceed the stain manufacturer's minimum recommended curing time of the concrete or 28 days, whichever is greater, prior to staining. Prepare the concrete surfaces of the sample panels and apply stain using the same materials and in the same manner as proposed for the structure, including staining of the joints between the stones produced by the form liner if applicable. Do not apply stain to the structure until the department approves the test panels.

C.5 Surfaces to be Coated.
Apply concrete stain to the surfaces in accordance to the plan.

D Measurement
The department will measure Concrete Staining B-53-329 in area by the square foot of surface, acceptably prepared and stained.

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

ITEM NUMBER	DESCRIPTION	UNIT
517.1010.S.01	Concrete Staining B-53-329	SF

Payment is full compensation for furnishing and applying the two coat system; for preparing the concrete surface; and for preparing the sample panels.
517-110 (20100709)

32. Culvert Pipe Temporary.

Perform this work in accordance to standard spec 520 and as herein after provided.

Payment for Culvert Pipe Temporary also includes removing and disposing of the temporary culverts and attached apron endwalls for culvert pipe.

33. Concrete Barrier Temporary Precast.

Perform this work in accordance to standard spec 603, these special provisions, and as hereinafter provided.

Concrete Barrier Temporary Precast shall be 12'-6" in length. Concrete Barrier Temporary Precast 10'-0" will not be allowed.

If the contractor chooses to store materials, equipment or other items that are a hazard within four-feet of the construction zone side (deflection zone) of the barrier the barrier shall be anchored. The barrier must also be anchored when used on edge of bridge decks or locations where the drop-off exceeds two-feet, is steeper than 3H:1V and is less than 4-feet from the side of the barrier closest to the drop off. The system must be anchored as shown in the standard detail drawing.

34. Cover Plates Temporary, Item 611.8120.S.

A Description
This special provision describes furnishing, installing and removing a steel plate to cover and support asphaltic pavement and traffic loading at manholes, inlets and similar structures during milling and paving operations.

B Materials
Provide a 0.25-inch minimum thickness steel plate that extends to the outside edge of the existing masonry.

C (Vacant)

D Measurement
The department will measure Cover Plates Temporary as units, acceptably completed in place.

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

ITEM NUMBER	DESCRIPTION	UNIT
611.8120.S	Cover Plates Temporary	Each

Payment is full compensation for furnishing, installing, and removing the cover plates; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the work.

The steel plates shall become the property of the contractor when no longer needed in the contract work.

35. Pipe Grates, 36-Inch, Item 611.9800.S.001; 42-Inch, Item 611.9800.S.002.

A Description
This special provision describes furnishing and installing pipe grates on the ends of pipes as shown in the plans, and as hereinafter provided.

B Materials
Furnish steel conforming to the requirements of standard spec 506.2.2.1. Furnish steel pipe conforming to the requirements of standard spec 506.2.3.6.

Furnish pipe grates galvanized according to ASTM A123.

Furnish angles and brackets galvanized according to ASTM A123.

Furnish required hardware galvanized according to ASTM A153.

C Construction
Repair pipes, rods, angles and brackets on which the galvanized coating has been damaged in accordance to the requirements of AASHTO M36M.

D Measurement
The department will measure Pipe Grates in units of work, where one unit is one grate, 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
611.9800.S.001	Pipe Grates, 36-Inch	Each
611.9800.S.002	Pipe Grates, 42-Inch	Each

Payment is full compensation for furnishing and installing all materials; and for drilling and connecting grates to pipes.
611-010 (20030820)

36. Fence Safety, Item 616.0700.S.

A Description
This special provision describes furnishing and installing a plastic fence at locations shown on the plans and as hereinafter provided.

B Materials
Furnish notched conventional metal "T" or "U" shaped fence posts.

Furnish fence fabric meeting the following requirements.

Color:	International orange (UV stabilized)
Roll Height:	4 feet
Mesh Opening:	1 inch min to 3 inch max
Resin/Construction:	High density polyethylene mesh
Service Temperature:	-60° F to 200° (ASTM D648)
Tensile Yield:	Avg. 2000 lb per 4 ft. width (ASTM D638)
Ultimate Tensile Strength:	Avg. 3000 lb per 4 ft. width (ASTM D638)
Elongation at Break (%):	Greater than 100% (ASTM D638)
Chemical Resistance:	Inert to most chemicals and acids

C Construction
Drive posts into the ground 12 to 18 inches. Space posts at 7 feet.

Use a minimum of three wire ties to secure the fence at each post. Weave tension wire through the top row of strands to provide a top stringer that prevents sagging.

Overlap two rolls at a post and secure with wire ties.

D Measurement
The department will measure Fence Safety by the linear foot along the base of the fence, center-to-center of posts.

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

ITEM NUMBER	DESCRIPTION	UNIT
616.0700.S.	Fence Safety	LF

Payment is full compensation for furnishing and installing fence and posts; maintaining the fence and posts in satisfactory condition; and for removing and disposing of fence and posts at project completion.
616-030 (20070510)

37. Furnishing and Planting Plant Materials.

The work under this item shall be in accordance to the plans, standard spec 632, as shown on the plans, and as hereinafter provided.

Modify standard spec 632.2.1 to include the following:

All plants shall be grown within the states of Wisconsin, Minnesota, Michigan, or parts of northern Illinois, Indiana or Ohio located within Zone 5 of the "Plant Hardiness Zone Map" produced by the United States Department of Agriculture, Miscellaneous Publication No. 1475, issued January, 1990, unless otherwise approved by the engineer.

Modify standard spec 632.2.2.8 as follows:

A list of sources for plants shall be furnished in accordance to standard spec 632.2.2.8 before planting begins for fall-planted plants and before March 15 for spring-planted plants. All sources will be subject to verification by the engineer.

Modify standard spec 632.2.3.4 to include the following:

Planting mixture blend shall be reviewed and approved by the engineer or construction representative before use on project. The engineer reserves the right to reject planting mixture that does not conform to the specifications and/or does not come with the appropriate material certificates. The engineer may require the contractor to take samples (for USDA soil texture classification, pH, % organic matter, nutrient content, cation exchange capacity, soluble salts, and the presence of any materials deleterious to plant growth) and provide testing through a qualified testing laboratory approved by the State of Wisconsin to confirm that topsoil meets the requirements outlined in standard spec 625.

Modify standard spec 632.2.4.2 as follows:

For fertilizer used in plant holes, provide a three-year release, water-soluble fertilizer contained in a micropore slow release polyethylene packet. Each packet shall contain two ounces of fertilizer. A single 2-ounce packet is considered one unit. The fertilizer shall conform to the following minimum requirements:

Nitrogen, not less than ----- 16%
Phosphoric Acid, not less than ----- 8%
Potash, not less than -----8%

For trees: The contractor shall use a minimum of two units and shall provide two units per caliper inch of tree trunk diameter. For one-half caliper measurements, the contractor shall round up. For example, a 2 ½" caliper tree should receive six units of fertilizer.

For shrubs: The contractor shall use a minimum of two units and shall provide one unit per 12 inches of plant height or spread.

Modify standard spec 632.2.6 to include the following:

Shredded Hardwood Bark Mulch for mulch rings around the base of plant material shall be finely shredded hardwood bark mulch and shall be the product of a mechanical chipper, hammermill, or tub grinder. The material shall be fibrous and uniformly dark brown in color, free of large wood chunks, and shall be substantially free of mold, dirt, sawdust, and foreign material. No portion of the material shall be in an advanced state of decomposition. The material shall not contain chipped up manufactured boards or chemically treated wood, including but not limited to wafer board, particle board, and chromated copper arsenate (CCA) or penta-treated wood. The material shall contain no bark of the black walnut tree. The material, when air dried, shall all pass a 4-inch screen and no more than 20 percent by mass of the material shall pass a 0.10-inch sieve. Unattached bark or greenleaf composition, either singly or combined, shall not exceed 20 percent each by mass. The maximum length of individual pieces shall not exceed 4 inches.

Contractor shall supply source of shredded hardwood bark mulch to the engineer. All sources will be subject to verification and approval by the engineer.

Modify standard spec 632.2.7 as follows:

Do not use wrapping on plant material.

Modify standard spec 632.2.9 as follows:

Provide rodent protection for trees as needed and only as approved by engineer.

Rodent protection shall be rigid plastic mesh made of recycled HDPE with an open mesh matrix ¾" by ¾" with each strand approximately 1/8" x 1/8" x 1/8". Product shall be UV treated and shall have a life expectancy of up to 5 years. Protection shall be 48 inches high. Contractor shall supply source of rodent protection to the engineer. All sources will be subject to verification and approval by the engineer.

Contractor shall use granular or similar rodent bait for shrub and perennial beds as needed and only as approved by engineer.

Modify standard spec 632.2.10 to include the following:

Contractor shall use 18" long soft polymer webbing strap with grommets at end of the two ends to secure wire or twine to tree. Contractor shall supply source of webbing straps to the engineer. All sources will be subject to verification and approval by the engineer.

The contractor shall provide tree stabilization for all trees:

- As indicated in the Plant Data Table;
- Planted on slopes greater than 4:1;
- Planted in areas prone to high winds;
- Planted in areas prone to flooding or with seasonally saturated soils;
- At the discretion of the landscape contractor to ensure viable, healthy plantings;
- At the discretion of the engineer.

Modify standard spec 632.3.1 as follows:

The normal spring planting season for all plants shall extend to June 15. The normal fall planting season begins September 15 and shall be completed by November 15 or up until the ground is frozen. Planting of evergreen trees and shrubs, and perennials in the fall shall be completed by October 15. If the overall construction schedule dictates that planting will occur between June 15 and September 15, the landscape contractor must first obtain approval from the engineer to begin installation outside of the normal planting seasons. If the engineer grants approval of the request, the contractor will also be held fully responsible for any and all additional maintenance associated with planting outside of the normal planting seasons including, but not limited to, supplemental watering above and beyond the typical, specified landscape maintenance and care cycle schedule.

Revise standard spec 632.3.1 to include the following:

Contractor shall take care not to damage or disturb adjacent finished landscape and will be responsible for seeding or sodding to repair any and all damage caused to adjacent seeded and/or sodded areas.

Revise standard spec 632.3.3 to include the following:

Landscape contractor shall stake out locations of all plant holes and obtain approval of staked location from construction representative or engineer prior to planting. Notify construction representative or engineer immediately of any discrepancies between the landscape working drawings and actual built condition of sidewalks, curbs, etc. that may affect placement of plant material. Obtain approval prior to planting in revised locations.

Revise standard spec 632.3.4 to include the following:

Ensure that the bottom of the hole is adequately compacted to guard against settling. Tamp or water in as necessary to create a condition by which plants will not settle in the planting beds. The bottom of the rootball shall be in direct contact with the bottom of the hole.

Standard spec 632.3.4 is revised as follows:

The minimum horizontal measurement of the plant hole shall be no less than 24 inches greater than the diameter of the ball, container, or root mass for the full depth of the planting hole.

Standard spec 632.3.7 shall include the following:

Remove the burlap and other wrapping materials including, but not limited to, twine, wire baskets, and plastic ribbon, from the entire root ball of B&B plants unless engineer determines that removal of said material will be detrimental to plant stability and/or establishment.

Revise standard spec 632.3.18.1.1 and standard spec 632.3.18.1.2 as follows:

The plant establishment period shall be two years and shall begin and end on the date of substantial landscape completion as determined by the engineer.

Standard spec 632.3.19.1 shall include the following:

The contractor shall remove all staking, bracing wire material, and other plant stabilization material at the end of the required establishment period.

The contractor shall leave in place all rodent protection measures at the end of the required establishment period.

The interval for a care cycle shall be 10-14 days between April 15 and October 31. There will be 13 required care cycles in a growing season.

The contractor shall perform a complete and thorough spring clean-out of all planting beds that contain trees, shrubs, perennials and/or ornamental grasses. Spring clean-out shall be performed during the first care cycle of the year (between April 15 and May 1) or as soon as weather and growing season conditions permit. Contractor shall not perform spring clean-out until the ground is no longer saturated from the spring thaw; walking on saturated soil will result in compaction. Spring clean-out shall include removal of past-season herbaceous material that was left standing over winter, cutting back ornamental grasses to within 3-inches of the mulched surface, removing any material damaged over the winter by pruning according to the language outlined in standard spec 632, removal of trash or other debris that has accumulated in planting beds, removal of leaves or other plant debris that has accumulated on the top of the mulched surface, replenishing mulch, weeding, and any and all other clean-out and maintenance operations as directed by the engineer or as required to produce an aesthetically pleasing, healthy environment for plant growth.

The contractor shall perform a complete and thorough fall clean-out of all planting beds that contain trees, shrubs, perennials, ornamental grasses and/or bulbs. Fall clean-out shall be performed during the last care cycle of the year (between October 15 and October 31). Contractor shall not perform fall clean-out if the soil is saturated from rain events and shall wait until the soil moisture levels have gone down before performing the final bed clean-out. Fall clean-out shall include coordination with the individual municipality's Forester or Parks Manager to determine which herbaceous perennial and ornamental grass material to leave standing through the winter and which to cut back to the ground, removing any material damaged during the growing season by pruning according to the language outlined in standard spec 632, removal of trash or other debris that has accumulated in planting beds, removal of leaves or other plant debris that has accumulated on the top of the mulched surface, replenishing mulch, weeding, and any and all other clean-out and maintenance operations as directed by the engineer or as required to produce an aesthetically pleasing, healthy environment for plant growth.

The contractor shall provide supplemental water during the April 15 to October 31 maintenance period as often as necessary to ensure healthy, thriving, and established plant material. The contractor may need to provide supplemental water even if irrigation is installed as part of the project and shall coordinate directly with the municipality to ensure that the plant material is not being overwatered or under-watered. The contractor will remain solely responsible for plant health and watering maintenance even in the event of irrigation system installation.

Re-mulching and multiple shovel edge cuts are expected to be performed immediately prior to the end of the two-year proving period. Work is incidental to Landscape Planting Surveillance and Care Cycles bid item. Additional payment for re-mulching and multiple edge cuts will not be granted.

38. Landscape Planting Surveillance and Care Cycles.

If the care specialist fails to perform any of the required care cycles as specified in standard spec 632.3.19.1, the department will assess daily damages in the amount of $1,000 per day to cover the cost of performing the work with other forces. The department will assess these damages for each day the requirements of the care cycle remain incomplete, except when the engineer extends the required time period.

39. Permanent Signing.

Do not remove any permanent signs such as stop, yield, stop ahead, yield ahead, folding stop signs, speed limit, signal ahead, do not enter or wrong way signs until the new permanent signs are installed. If any of these signs need to be removed due to construction activities, place a temporary sign at the location or as directed by the engineer until the permanent sign is installed. These signs shall be incidental to the item "Traffic Control (Project)."

WisDOT will be installing new signs on I-39/90 during this project. Coordinate with WisDOT for the installation of these signs. Contact Iver Peterson at (608) 785-9060 two weeks prior to installing the permanent exit guide signs for the STH 11/E. Racine Street interchange.

40. Overhead Sign Support, S-53-63.

Overhead Sign Support, S-53-63 shall be placed on Structure B-53-329 and supported on the bridge as shown in the plans for Structure B-53-329. The overhead sign support supplier shall provide the anchor bolts, per manufacturer's recommendations, for installation into Structure B-53-329. The bridge contractor shall place the overhead sign support anchor bolts in the bridge per the approved shop drawings. Coordination between the sign support contractor and bridge contractor is required for placement of the anchor bolts and overhead sign support.

41. Traffic Control.

Perform this work in accordance to the requirements of standard spec 643, 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 10 days prior to the preconstruction conference.

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 therefore.

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.

The turning of traffic control devices when not in use to obscure the message will not be allowed under this contract.

Obtain prior approval from the engineer for the location of egress and ingress for construction vehicles to prosecute the work.

Cover 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.
- 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 1000 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.

42. Pavement Marking Grooved Wet Reflective Contrast Tape 4-Inch, Item 646.0841.S; 8-Inch, Item 646.0843.S.

A Description

This special provision describes furnishing, grooving and installing preformed wet reflective pavement marking contrast tape for grooved applications as shown on the plans, according to standard spec 646, and as hereinafter provided.

B Materials

Furnish wet reflective pavement marking contrast tape and adhesive material, per manufacturer's recommendation if required, from the department's approved products list.

Furnish a copy of the manufacturer's recommendations to the engineer before preparing the pavement marking grooves.

C Construction

C.1 General

For quality assurance, provide the engineer and the region's Marking Section evidence of manufacturer training in the proper placement and installation of pavement marking contrast tape.

Plane the grooved lines according to details in the plan and per manufacturer's recommendations. Use grooving equipment with a free-floating, independent cutting head. Plane a minimum number of passes to create a grooved surface per manufacturer's recommendations.

C.2 Groove Depth
Cut the groove to a depth of 120 mils ± 10 mils from the pavement surface or, if tined, from the high point of the tined surface. To measure the depth, the contractor may use a depth plate placed in the groove and a straightedge placed across the plate and groove, or the contractor may use a straightedge placed perpendicular to the groove. The department may periodically check groove depths.

C.3 Groove Width – Longitudinal Markings
Cut the groove one-inch wider than the width of the tape.

C.4 Groove Position
Position the groove edge according to plan details. Groove a minimum of 4 inches, but not greater than, 12 inches from both ends of the tape segment. Achieve straight alignment with the grooving equipment.

C.5 Groove Cleaning
C.5.1 Concrete
Cooling the cutting head with water may be necessary for some applications and equipment. If cooling water is necessary, flush the groove immediately with high-pressure water after cutting to remove any build-up of cement dust and water slurry. If this is not done, the slurry may harden in the groove.

If water is used in the grooving process, allow the groove to dry a minimum of 24 hours after groove cleaning, and prior to pavement marking application. The groove surface shall be clean and dry before applying the adhesive, and the pavement marking tape. Use a high-pressure air blower with at least 185 ft^3/min air flow and 120 psi air pressure to clean the groove; use of the air blower does not decrease the amount of time required for the groove to dry.

C.5.2 New Asphalt
Groove pavement five or more days after paving.

Use a high-pressure air blower with at least 185 ft^3/min air flow and 90 psi air pressure to clean the groove.

C.5.3 Existing Asphalt
Check for structural integrity in supporting grooving operations. If the structural integrity of the asphalt pavement is inadequate to support grooving operations, immediately notify the engineer.

Use a high-pressure air blower with at least 185 ft^3/min air flow and 90 psi air pressure to clean the groove.

C.6 Tape Application
Apply the tape when both the air and surface temperature are 40 degrees F and rising.

Apply tape in the groove as per manufacturer's recommendations. If manufacturer's recommendations require surface preparation adhesive:

- For the Southeast Region and the ozone non-attainment Northeast Region counties of Sheboygan, Manitowoc, and Kewaunee:
  - Apply SPA-60 during May 1 to September 30, both dates inclusive due to Volatile Organic Compound Limitations.
  - Apply P-50 during October 1 to April 30, both dates inclusive.
- For the remainder counties:
  - Apply either adhesive.

Refer to the manufacturer's instructions for determining when the surface preparation adhesive is set.

Tamp the wet reflective pavement marking contrast tape with a tamper cart roller, with a minimum of a 200-lb load, cut to fit the groove. Tamp a minimum of three complete cycles (6 passes) with grooved modified tamper roller cart.

D Measurement
The department will not measure Pavement Marking Grooved Wet Reflective Contrast Tape (Width).). The department will use pay plan quantity according to standard spec 109.1.1.2.

E Payment
The department will pay for plan quantities according to standard spec 109.1.1.2 at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
646.0841.S	Pavement Marking Grooved Wet Reflective Contrast Tape 4-Inch	LF
646.0843.S	Pavement Marking Grooved Wet Reflective Contrast Tape 8-Inch	LF

Payment is full compensation for cleaning and preparing the pavement surface; furnishing and installing the material; and for removing temporary pavement marking, if necessary.

43. Removing Pavement Marking.

Perform this work in accordance to standard spec 646.3.4 and as hereinafter provided.

Pavement Markings required to be removed on permanent pavement (pavement that will remain at the completion of the contract) will be removed by a water blasting or hydroblasting method. Grinding or sand blasting the markings off the pavement will not be allowed.

44. General Requirements for Electrical Work.

Amend standard spec 651.2, Materials, by adding the following paragraphs:

(7) The approved products list is located at:
http://www.dot.wisconsin.gov/business/engrserv/docs/ap3/electrical.pdf

45. Concrete Bases Type 6, Item 654.0106.

A Description
This work shall be in accordance to the requirements of standard spec 654, the plans, standard detail drawings, and as hereinafter provided.

B Materials
In accordance to the plans and standard spec 654.2 and as hereinafter provided.

Furnish a rigid form as required to set the location of all concrete bases in areas with retaining wall backfill. A rigid form shall maintain the required shape without deflection during retaining wall backfill operations.

C Construction
In accordance to the plans and standard spec 654.3 and as hereinafter provided.

Install a rigid form as required to set the location of all concrete bases in areas with retaining wall backfill. This item may require locating the horizontal and vertical position of the concrete base during the retaining wall backfill operation. Rigid forms shall be set plumb and shall be placed to avoid retaining wall soil stabilization straps. Excavation for the concrete bases may not be allowed after the retaining wall backfill is completed. Verify the locations of all concrete bases are accurately represented on the contractor-designed wall plans as submitted to the engineer. Coordinate all construction activities as required.

D Measurement
The department will measure the Concrete Bases Type 6 bid item as each individual base, acceptably completed.

E Payment
In accordance to the plans and section 654.5 of the standard specifications and as hereinafter provided.

Payment includes furnishing and installing a rigid form; and for coordination with retaining wall construction operations.

46. Electrical Service Meter Breaker Pedestal (CB 200), Item 656.0200.001.

A Description
This work shall be in accordance to the requirements of standard spec 656, the plans, standard detail drawings, and as hereinafter provided.

B Materials
Amend standard spec 656.2.3, Meter Breaker Pedestal Service, paragraph (1) to read as follows:

> (1) Furnish an approved service having a meter breaker pedestal, 22,000-AIC circuit breakers unless the local utility requires otherwise, grounding electrodes and connections, conduit and fittings, and all necessary conductors and equipment required by the WSEC and the utility for a service connection. Furnish a pedestal with two 100 A 2-pole breakers for any meter with shared ITS uses which are intended to provide electrical service for a WisDOT street lighting system as well as an ITS camera system. When the meter breaker pedestal is energized, install an approved meter seal at all access points on the meter trough. Meter shall be time of use type.

C Construction
Amend standard spec 656.3.2, Service Lateral, paragraph (1) to read as follows:

> (1) The local utility shall furnish and install a 200 A, 120/240 volt AC, single phase, 3-wire underground electrical service lateral. Arrange and assume responsibility for the timely installation of the service lateral by the utility. The lateral shall be terminated at a meter pedestal as the plans show.
>
> Ensure that electrical service is installed and energized a minimum of one week prior to the lighting system activation deadline.

D Measurement
The department will measure the Electrical Service Meter Breaker Pedestal bid item as a single lump sum for each service, acceptably completed.

E Payment
In accordance to the plans and standard spec 656.5.

47. Electrical Service Meter Breaker Pedestal (CB1), Item 656.0200.003.

A Description
This work shall be in accordance to the requirements of standard spec 656, the plans, standard detail drawings, and as hereinafter provided.

B Materials
In accordance to the plans and standard spec 656.2.

C Construction
In accordance to the plans and standard spec 656.3 and as follows:

Obtain a City of Janesville Electrical Permit from the Housing, Building, and Neighborhood Services Department prior to performing any work. Pay all permit fees.

Ensure that electrical service is installed and energized a minimum of one week prior to the system activation deadline.

D Measurement
The department will measure the Electrical Service Meter Breaker Pedestal bid item as a single lump sum for each service, acceptably completed.

E Payment
In accordance to the plans and standard spec 656.5.

48. Anchor Assemblies Light Poles on Structures, Item 657.6005.S.

A Description
This special provision describes furnishing and installing anchor bolt assemblies for light poles as shown on the plans, and as hereinafter provided.

B Materials
Furnish anchors of the size and spacing as given on the plans, and that conform to ASTM A449 or AASHTO M314 GR 55. The upper 8 inches of the bolts, nuts, and washers shall be hot-dipped galvanized in accordance to ASTM A153, Class C. Provide enlarged threads on nuts for proper fit after galvanizing.

C Construction
Provide two nuts and two washers per anchor bolt, and install per light standard manufacturer's recommendations.

D Measurement
The department will not measure Anchor Assemblies Light Poles on Structures. The department will use pay plan quantity according to standard spec 109.1.1.2.

E Payment
The department will pay for plan quantities according to standard spec 105.1.1.2 at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
657.6005.S	Anchor Assemblies Light Poles on Structures	Each

Payment is full compensation for furnishing and installing the anchorages.
657-060 (20100709)

49. Luminaires Utility HPS 250 Watt, Item 659.0125.

A Description
This work shall be in accordance to the requirements of standard spec 659, the plans, standard detail drawings, and as hereinafter provided.

B Materials
In accordance to standard spec 659.2 and as hereinafter provided:

Furnish luminaires with provisions for photocell operation for all lights on the City of Janesville's CB100 service.

C Construction
In accordance to the plans and standard spec 659.3.

D Measurement
In accordance to the plans and standard spec 659.4.

E Payment
In accordance to the plans and standard spec 659.5.

50. Traffic Signal Timing – Racine Street and Palmer Drive.

Traffic signals, both permanent and temporary, at the Racine Street and Palmer Drive intersection shall be fully operational, as shown in the "Sequence of Operations" sheets in the plan set. The traffic signals shall be timed according to the following traffic signal timings. All other permanent and temporary traffic signals shall be operated by WisDOT Southwest Region's staff.

Time-based coordination programs and pre-emption timings may be implemented by the city or WisDOT staff during construction. Coordinate the implementation into the temporary and/or permanent signal controllers.

All work required to install signal timing, perform test operations and make updates shall be considered incidental to the bid items of "Temporary Traffic Signals for Intersections – Racine Street and Palmer Drive" and Remove and Reinstall Traffic Signals – Racine Street and Palmer Drive.

TEMPORARY SIGNAL TIMING
RACINE STREET and PALMER DRIVE

Actuated Settings

	Phase					
	1	2	4	5	6	8
Approach Name	EBL Racine St	WB Racine St	NB Palmer Dr	WBL Racine St	EB Racine St	SB Palmer Dr
Minimum Green (sec.)	6.0	15.0	10.0	6.0	15.0	10.0
Passage Time (sec)	1.5	5.0	1.5	1.5	5.0	1.5
Maximum Green (sec)	10.0	35.0	20.0	10.0	35.0	20.0
Allowable Gap (sec)	0.0	3.5	0.0	0.0	3.5	0.0
Time Before Reduction (sec)	0.0	20.0	0.0	0.0	20.0	0.0
Time to Reduce (sec)	0.0	20.0	0.0	0.0	20.0	0.0
Yellow Change (sec)	3.5	4.5	3.0	3.5	4.5	3.0
Red Clearance (sec)	0.5	1.8	3.6	0.5	1.8	3.6
Walk (sec) - Stage 2 / Stage 3	---	7 / 7	7 / 0	---	0 / 7	7 / 7
Ped Clearance (sec) - Stage 2 / 3	---	20 / 17.7	38.6 / 0	---	0 / 18.9	14.3 / 11.1
Phase Locking	Non-Locking	Locking	Non-Locking	Non-Locking	Locking	Non-Locking
Phase Recall	None	Min.	None	None	Min.	None

PERMANENT SIGNAL TIMING
RACINE STREET and PALMER DRIVE

Actuated Settings

	Phase					
	1	2	4	5	6	8
Approach Name	EBL Racine St	WB Racine St	NB Palmer Dr	WBL Racine St	EB Racine St	SB Palmer Dr
Minimum Green (sec.)	4.0	18.0	8.0	4.0	18.0	8.0
Passage Time (sec)	3.0	5.0	3.5	3.0	5.0	3.5
Maximum Green (sec)	10.0	35.0	20.0	10.0	35.0	20.0
Allowable Gap (sec)	0.0	3.5	0.0	0.0	3.5	0.0
Time Before Reduction (sec)	0.0	20.0	0.0	0.0	20.0	0.0
Time to Reduce (sec)	0.0	20.0	0.0	0.0	20.0	0.0
Yellow Change (sec)	3.5	4.2	4.5	3.5	4.2	4.5
Red Clearance (sec)	0.0	1.8	2.5	0.0	1.8	2.5
Walk (sec)	---	7.0	14.0	---	7.0	14.0
Ped Clearance (sec)	---	13.0	25.0	---	12.0	25.0
Phase Locking	Non-Locking	Locking	Non-Locking	Non-Locking	Locking	Non-Locking
Phase Recall	None	Min.	None	None	Min.	None

51. Temporary Traffic Signals for Intersections (STH 11 and Temporary Northbound Ramp – Stage 2), Item 661.0200.002; Temporary Traffic Signals for Intersections (STH 11 and Temporary Northbound Ramp – Stage 3), Item 661.0200.003; Temporary Traffic Signals for Intersections (STH 11 and Temporary Southbound Ramp – Stage 2), Item 661.0200.004; Temporary Traffic Signals for Intersections (STH 11 and Temporary Southbound Ramp – Stage 3), Item 661.0200.005.

A Description
This work shall be in accordance to the requirements of standard spec 661, the plans, standard detail drawings, and as hereinafter provided.

B Materials
In accordance to the plans and standard spec 661.2 and as hereinafter provided.

Furnish aerial cable rated for power distribution and sized to deliver the necessary voltage when temporary traffic signal installations are located well beyond the electrical service point. Furnish poles of sufficient length to allow for grading operations to occur as construction progresses, while providing working clearances to surrounding surfaces at all times.

Furnish an emergency vehicle preemption system compatible with the City of Janesville's system and users. Contact the city (contact data in previous articles) for information regarding the equipment needs and operational requirements of the emergency vehicle preemption system. Coordinate any potential reuse of existing equipment with the city at least 2-weeks prior to the removal of the existing signals. All emergency vehicle preemption materials furnished and/or reused shall be considered incidental to this bid item.

C Construction
In accordance to the plans and standard spec 661.3 and as hereinafter provided.

Identify a route for the overhead power distribution line which provides for minimal interference with staged construction activities. Coordinate the route planning with all items of work associated with the project.

Stake out the planned overhead power distribution route in the field and notify the engineer for approval prior to starting work.

Install the emergency vehicle preemption system in accordance to the plans and the City of Janesville's needs. Mount receivers as required for line of sight activation for each stage of operation. Arrange for testing of equipment prior to acceptance of the installation of each stage as needed.

D Measurement
The department will measure the Temporary Traffic Signals for Intersections (Location) bid item as a single lump sum for each location, acceptably completed.

E Payment
In accordance to the plans and standard spec 661.5 and as hereinafter provided.

Payment includes furnishing and installing emergency preemption equipment, aerial power distribution cables; and for overhead route planning, approval and staking.

52. Intelligent Transportation Systems – Conduit.

Supplement standard spec 671.2 with the following:

671.2.4 Locate Wire
Furnish and install a No. 14 AWG stranded copper wire for future locate purposes through each conduit run. For conduit runs containing multiple conduit ducts with common points of termination, place a single locate wire in one of the conduit ducts (place locate wire in an empty duct if available). Connect the locate wire by using a wire nut at each pull box, manhole, or other access point. Alternatively, use a single wire through the access points. Furnish material under this item in accordance to standard spec 655.

671.2.5 Duct Sealant
Furnish and install a climate appropriate duct sealant in all conduit openings within an environmentally protected enclosure in order to prevent vermin infestation. Environmentally protected enclosures include, but are not limited to, controller cabinets, dynamic message signs and communications huts.

53. Install Pole Mounted Cabinet, Item 673.0225.S.

A Description
This special provision describes installing department furnished aluminum enclosures on poles for intelligent transportation systems equipment.

B Materials
Use stainless steel bolts, nuts, and washers unless otherwise specified.

All conductors, terminals, and parts that could be hazardous to maintenance personnel shall be protected with suitable insulating material.

The cabinet will be equipped with service panels. Two panels shall be provided and mounted on the cabinet sidewalls. The left side panel shall be designated as "Input/Communications," and the right side panel shall be designated as the "Service Panel."

The service panel will be equipped with a four-outlet handi-box. Wire the handi-box to the series portion of the filtering surge protector.

Furnish and install rigid metallic conduit from the pole mounted cabinet's breaker disconnect box to the nearest electric pull box unless otherwise noted on the plans. A typical installation requires one 2-inch rigid metallic conduit, though certain sites may require additional conduits. Use metallic conduit according to standard spec 652.

C Construction
Fasten the field cabinet securely onto a pole. Provide bolted stainless steel connections with lock washers, locking nuts, or other engineer-approved means to prevent the

connection nuts from backing off. Isolate dissimilar materials from one another using stainless steel fittings. Make all power connections to the cabinet as specified in standard spec 656.

Drill and tap the cabinet, as necessary, to mount the terminal blocks and other attachments to the service panel, to provide an entrance on the back of the cabinet for cable from the pole mounted intelligent transportation systems equipment, and to mount the service panel to the cabinet. Remove all sharp edges or burrs, or both, caused by the cutting or drilling process. Seal all openings to prevent water from entering the cabinet. Mount the surge protector to the service panel.

Install metallic conduit on the exterior of the pole as shown in the plans, and according to the applicable requirements of standard spec 652.

D Measurement
The department will measure Install Pole Mounted Cabinet as each individual assembly, 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
673.0225.S	Install Pole Mounted Cabinet	Each

Payment is full compensation for installing the pole mounted cabinet; for making all connections and conduit/wire entrances; and for furnishing all testing.

54. Install Ethernet Switch, Item 675.0400.S.

A Description
This special provision describes installing a department furnished Ethernet switch.

B Materials
The department will furnish the Ethernet switch. Provide all necessary cables between the Ethernet switch and other devices.

C Construction
Install the Ethernet switch in a pole mounted cabinet or field cabinet as indicated on the plans. Connect it to devices as shown on the plans, or as directed by the engineer.

D Measurement
The department will measure Install Ethernet Switch by the unit, installed according to the contract, tested, and accepted.

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

ITEM NUMBER	DESCRIPTION	UNIT
675.0400.S	Install Ethernet Switch	Each

Payment is full compensation for installing an Ethernet switch; furnishing all necessary incidental hardware; and making all necessary connections.

55. Install Video Encoder, Item 677.0300.S.

A Description
This special provision describes installing a department furnished video encoder.

B Materials
The department will furnish the video encoder. Provide Category 5e or better Ethernet cable to connect the video encoder to the Ethernet switch.

C Construction
Install the video encoder in a pole mounted cabinet or field cabinet as indicated on the plans. Connect it to devices as shown on the plans, or as directed by the engineer. Program the video encoder according to manufacturer's instructions.

D Measurement
The department will measure Install Video Encoder by the unit, installed according to the contract, tested, and accepted.

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

ITEM NUMBER	DESCRIPTION	UNIT
677.0300.S	Install Video Encoder	Each

Payment is full compensation for installing the video encoder in a pole mounted cabinet or field cabinet; for making all connections; and for furnishing all programming.

56. Subsoiling, Item SPV.0005.001.

A Description
This special provision describes providing reduced soil compaction in all areas shown on the plans.

B (Vacant)

C Construction
Subsoiling shall be performed by the prime contractor or excavating contractor and shall occur after topsoil placement. Schedule a 50-foot two directional test and demonstrate competence to the engineer prior to continuing operations. The engineer will indentify the test area. Loosen the in-place material and topsoil in the subsoiled area to a depth of 20 inches. Proceed and complete the subsoiling operations after obtaining approval from

the engineer that the equipment and methods are sufficient to perform the work. Work done without the approval of the engineer will be considered as unauthorized work.

Perform the subsoiling in two sets of passes to form a two-directional (90°) grid. Create channels by a commercially available, multi-shanked implement attached to track-type equipment. The equipment shall be capable of exerting a penetration force necessary for the site. Disc cultivators, chisel plows and spring-loaded equipment will not be allowed. Space the grid channels 24 to 30 inches apart, depending on equipment, site conditions and the plan. The channel depth shall be a minimum of 20 inches or as specified in the plans. If soils are saturated, delay operations until the soil dries to field capacity or less. Field capacity is the amount of water retained in the soil after it has been saturated and allowed to drain freely.

On erodible slopes greater than 6 horizontal to 1 vertical, perform only one pass. Under these conditions, work shall be at right angles to the direction of surface drainage whenever practical. Exceptions to subsoil includes areas within the drip line of any existing trees, over utility installations within 30 inches of the surface, when trenching/drainage lines are installed, where compaction is by design (abutments, footings or inslopes) and inaccessible slopes, as approved by the engineer. In case where exceptions occur, observe a minimum setback as directed by the engineer.

Upon completion and acceptance of the subsoiled area, grade topsoil as described in section 652.3.3 of the standard specifications, except that only light-weight equipment, as approved by the engineer, may be used to place and spread topsoil and to break down clods and lumps. No other equipment may be driven over the subsoiled area after the topsoil is finish-graded. Any subsoiled areas that are re-compacted by the contractor's equipment must be subsoiled and finish-graded at no expense to the department.

D Measurement
The department will measure Subsoiling by the acre, 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.0005.001	Subsoiling	ACRE

Payment is full compensation for completing test areas; and for furnishing all labor, tools, equipment, and incidentals necessary to complete the contract work.

57. Planting Mixture, Item SPV.0035.500.

A Description
This special provision describes furnishing and installing Planting Mixture at the locations shown on the plans and in accordance to the requirements of standard spec 632, the plans, and as hereinafter provided.

B Materials

The landscape contractor who is responsible for furnishing and installing plant material shall also be solely responsible for obtaining planting mixture components, blending the mixture to the specified proportions, and for furnishing and installing the planting mixture.

B.1 Planting Mixture

The planting mixture consists of the following blend by volume:

- 2 parts topsoil. Topsoil shall conform to standard spec 625.
- 1 part sand. Obtain the engineer's approval for the sand.
- 1 part compost. Compost shall be either well-rotted shredded leaf mulch, free of disease; or well-rotted, unleached, stable or cattle manure containing no more than 25 percent by volume of straw, sawdust, or other bedding materials and free of toxic substances. Either shall be free of stones, sticks, soil, weed seeds, debris, and other material harmful to plant growth.
- 1 part peat moss. Peat moss shall conform to standard spec 632.

C Construction

C.1 Coordination

Planting Mixture shall be delivered to project site and installed no more than seven days before the start of planting operations for areas receiving Planting Mixture. It is the sole responsibility of the landscape contractor to fully coordinate and schedule the delivery and installation of the Planting Mixture with the delivery and installation of all landscape plant materials.

C.2 Planting Mixture Preparation and Placement

Contractor shall provide, in writing to the supervising engineer, a list of all materials used in Planting Mixture including manufacturers and quantities and shall ensure that all materials meet the standards set forth in standard spec 625 and standard spec 632 and produce a planting mixture that provides a stable, healthy soil for plant growth.

Ensure proper excavation of planting area for all areas to receive Planting Mixture. Prepare areas by removing any construction materials, stone, or other debris larger than 2" in length or diameter for all areas.

Provide Planting Mixture for the central islands of roundabouts and for specialized planting beds as indicated in the plans.

Provide Planting Mixture over entire planting bed area and fine grade to match grades as indicated on plans or to adjacent back of curb or other hardscape surface as indicated on plans and account for settling. Place Planting Mixture in 6-inch to 8-inch lifts, watering in or tamping to reduce settling potential. A minimum of 24" depth shall be provided in the central islands of roundabouts and for specialized perennial beds as indicated in the plans.

Obtain approval of Planting Mixture depths, locations, and elevations by supervising engineer prior to planting.

D Measurement
The department will measure Planting Mixture by the cubic yard, 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.0035.500	Planting Mixture	CY

Payment is full compensation for excavating existing material out, and for furnishing and installing all materials.

58. Topsoil Special, Item SPV.0035.501.

A Description
This special provision describes excavating and disposing of material taken from within planting bed and tree planting locations in accordance to standard spec 205 and furnishing and installing topsoil at the planting bed and tree planting locations in accordance to the requirements of standard spec 625, the plans, and as hereinafter provided.

B Materials
Excavate materials in accordance to standard spec 205. Furnish topsoil materials in accordance to standard spec 625.

C Construction
Excavate materials as the plans show or the engineer allows from the planting bed areas and tree planting areas in accordance to standard spec 205. Dispose of surplus or unsuitable material as specified in standard spec 205.3.12. Place Topsoil Special in accordance to standard spec 625 in locations shown on the plans, and to a minimum depth of 24 inches. Provide a minimum area of 8 feet by 8 feet for each tree. No Topsoil Special is required for trees planted in designated planting beds where Planting Mixture Special is specified.

D Measurement
The department will measure Topsoil Special by the cubic yard of excavated material acceptably removed in accordance to standard spec 205.4.1 and acceptably replaced with topsoil in accordance to standard spec 625.4.1(3).

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

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0035.501	Topsoil Special	CY

Payment is full compensation for excavating and disposing of planting bed and tree planting area materials, furnishing and placing all topsoil materials in planting bed and tree planting areas, including excavating, loading, and hauling.

59. High Performance Concrete (HPC) Masonry Structures, Item SPV.0035.700.

This special provision describes specialized material and construction requirements for high-performance concrete used in bridge structures. Conform to standard spec 501, 502 and 509, as modified in this special provision. Conform to standard spec 715 s for QMP Concrete Pavement and Structures.

MODIFY THE STANDARD SPECIFICATIONS AS FOLLOWS:

501.2.5.4.1 General
Replace the entire text with the following:
(1) Use clean, hard, durable crushed limestone with 100% fractured surfaces and free of an excess of thin or elongated pieces, frozen lumps, vegetation, deleterious substances or adherent coatings considered injurious.

(2) Use virgin aggregates only.

501.2.5.4.2 Deleterious Substances
Replace paragraph one with the following:

(1) The amount of deleterious substances must not exceed the following percentages:

DELETERIOUS SUBSTANCE	PERCENT BY WEIGHT
Shale	1.0
Coal	1.0
Clay lumps	0.3
Soft fragments	5.0
Any combination of above	5.0
Thin or elongated pieces based on a 3:1 ratio	15.0
Materials passing the No. 200 sieve	1.5
Chert[1]	1.0

[1]Material classified lithologically as chert and having a bulk specific gravity (saturated surface-dry basis) of less than 2.45. Determine the percentage of chert by dividing the weight of chert in the sample retained on a 3/8-inch sieve by the weight of the total sample.

501.2.5.4.3 Physical Properties
Replace paragraph one with the following:

(1) The department will ensure that Los Angeles wear testing conforms to AASHTO T 96, soundness testing conforms to AASHTO T 104 using 5 cycles in sodium sulfate solution on aggregate retained on the No. 4 sieve, and freeze-thaw soundness testing conforms to AASHTO T 103. The percent wear must not exceed 35, the weighted soundness loss must not exceed 6 percent, and the weighted freeze-thaw average loss must not exceed 12 percent.

501.3.2.4.3.3 Extended Delivery Time
Delete paragraph one.

501.3.5.1 General
Replace paragraph one with the following:

(1) Use central-mixed concrete as defined in standard spec 501.3.5.1(2) for all work under this special provision.

501.3.5.2 Delivery
Replace paragraph three with the following:

(3) Deliver and completely discharge concrete within one hour beginning when adding water to the cement, or when adding cement to the aggregates. A decrease in air temperature below 60° F or the use of department-approved retarders does not increase the discharge time.

501.3.7.1 Slump
Replace the entire text with the following:

(1) Use a 2-inch to 4-inch slump.

(2) Perform the slump tests for concrete according to AASHTO T 119.

501.3.8.2.1 General
Replace the entire text with the following:

(1) The contractor is responsible for the quality of the concrete placed in hot weather. Submit a written temperature control plan at or before the pre-pour meeting. In that plan, outline the actions the contractor will take to control concrete temperature if the concrete temperature at the point of placement exceeds 80° F. Do not place concrete without the engineer's written acceptance of that temperature control plan. Perform the work as outlined in the temperature control plan.

(2) If the concrete temperature at the point of placement exceeds 80° F, do not place concrete for items covered in this special provision.

(3) Notify the engineer whenever conditions exist that might cause the temperature at the point of placement to exceed 80° F. If project information is not available, the contractor should obtain information from similar mixes placed for other nearby work.

(4) The department will pay $0.75 per pound for the quantity of ice required to reach a target temperature of 75 F if the following conditions are met:

1. The un-iced concrete temperature exceeds 80 F.

2. The contractor has performed the actions outlined in the contractor's accepted temperature control plan.

3. The contractor elects to use ice.

501.3.8.2.2 Bridge Decks
Replace the entire text with the following:

(1) Do not place concrete for bridge decks when the ambient air temperature is above 80° F.

(2) For concrete placed in bridge decks, submit a written evaporation control plan at each pre-pour meeting. In that plan, outline the actions the contractor will take to maintain concrete surface evaporation at or below 0.15 pounds per square foot per hour. Do not place concrete for bridge decks without the engineer's written acceptance of that evaporation control plan. Perform the work as outlined in the evaporation control plan.

(3) If predicting a concrete surface moisture evaporation rate exceeding 0.15 pounds per square foot per hour, do not place concrete for bridge decks.

(4) Provide evaporation rate predictions to the engineer 24 hours prior to each bridge deck pour.

(5) Compute the evaporation rate from the predicted ambient conditions at the time and place of the pour using the nomograph, or computerized equivalent, specified in CMM 5.25, figure 1. Use weather information from the nearest national weather service station. The engineer will use this information to determine if the pour will proceed as scheduled.

(6) At least 8 hours before each pour, the engineer will inform the contractor in writing whether or not to proceed with the pour as scheduled. If the actual computed evaporation rate during the pour exceeds 0.15 pounds per square foot per hour, at the sole discretion of the engineer, the contractor may be allowed to implement immediate corrective action and complete the pour.

502.2.6.2 Burlap
Replace the entire text with the following:

(1) Furnish burlap conforming to AASHTO M 182, class 1, 2, 3 or 4.

502.3.5.4 Superstructures
Delete paragraph six.

502.3.7.8 Floors
Delete paragraphs thirteen, fourteen and fifteen.

Add the following to the end as paragraphs nineteen, twenty and twenty-one.
(19) Do not place bridge deck concrete more than 10 feet ahead of the finishing machine. If there is a delay of more than 10 minutes during the placement of a bridge deck, cover all concrete (unfinished and finished) with wet burlap to protect the concrete from evaporation until placement operations resume.

(20) Hand finishing, except for the edge of deck, must be kept to a minimum. The finishing machine must be equipped with a pan behind the screed. Apply micro texture using a broom or turf drag following the use of a 10-foot straight edge. Only finish by hand as necessary to close up finished concrete. Begin wet curing the deck immediately following the micro texture.

(21) For bridge decks with a design speed of 40 mph or greater, provide longitudinal grooving according to the provision included in this contract.

502.3.8.1 General
Replace paragraph one with the following:

(1) Maintain adequate moisture throughout the concrete mass to support hydration for at least 14 days.

502.3.8.2.1 General
Replace the entire text with the following:

(1) Wet-cure the concrete for bridge decks, sidewalks and raised medians for 14 days by use of a soaker hose system, or other engineer-approved methods. Cover the finished surface of bridge decks and overlays with one layer of wetted burlap or wetted cotton mats within 10 minutes after the finishing machine has passed. Apply the burlap/cotton gently so as to minimize marking of the fresh concrete. Keep the first layer of burlap/cotton continuously wet until the bridge deck or overlay is sufficiently hard to apply a second layer of wetted burlap/cotton. Immediately after applying the second layer of burlap/cotton, continue to keep the deck wet until placing and activating the soaker hose system. Throughout the remainder of the curing period, keep the burlap/cotton continuously wet with soaker hoses hooked up

to a continuous water source. Inspect the burlap/cotton twice daily to ensure the entire surface is moist. If necessary, alter the soaker hose system as needed to ensure the entire surface is completely covered and stays moist. After 48 hours from the time of completion of the bridge deck or overlay pour, the soaker hose system and burlap/cotton may be covered with polyethylene sheeting. Provide a continuous flow of water through the soaker hose system for the entire curing period.

(2) Do not uncover any portion of the deck at any time for any reason during the first 7 days of the curing period.

(3) Set up and test the fogging system before each bridge deck, raised median and sidewalk pour. The fogging system must remain set up and in operating condition for the duration of the pour.

502.3.8.2.3 Decks
Delete the entire text.

502.3.8.2.4 Parapets
Replace the entire text with the following:

(1) Cure the inside and outside concrete faces and tops of railings or parapets by covering with wetted burlap immediately after form removal and surface finish application. Keep the burlap thoroughly wet for at least 7 days; or by covering for the same period with thoroughly wet polyethylene-coated burlap conforming to standard spec 502.2.6.4

(2) Secure coverings along all edges to prevent moisture loss.

502.3.9.6 Bridge Decks
Replace paragraph two with the following:

(2) Protect the underside of the deck, including the girders, for bridge deck and overlay pours by housing and heating when the national weather service forecast predicts temperatures to fall below 32° F during the cold weather protection period. Maintain a minimum temperature of 40° F in the enclosed area under the deck for the entire 14-day curing period.

502.5.1 General
Replace paragraph one with the following:

The department will pay for plan quantities according to standrad spec 109.1.1.2 at the contract unit price and incidentals necessary to complete the work under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0035.700	High Performance Concrete (HPC) Masonry Structures	CY

710.5 Sampling and Testing
Add the following standard spec:

710.5.7 Chloride Penetration Resistance
(1) For each new or changed mix design, measure chloride penetration resistance according to AASHTO T 277 (Rapid Chloride Permeability Test) at a frequency of 1 test per 3 months (quarterly) of production.

(2) Permeability samples for AASHTO T 277 testing must be stripped of their molds and wet cured to an age of 7 days in a standard moist room or water tank. After 7 days, submerge the samples in water heated to 100° F until an age of 28 days. Upon completion of the curing process, obtain one sample from each cylinder and test according to AASHTO T 277.

(3) Ensure that the initial accepted mix designs meet the chloride penetration resistance limit of 1500 coulombs based on the AASHTO T 277 Rapid Chloride Permeability test. Chloride resistance testing conducted quarterly using AASHTO T 277 Rapid Chloride Permeability Test during production will not be used for acceptance of previously accepted mixes and concrete masonry mixed and placed according to the contract requirements. For quarterly chloride resistance test results exceeding 1500 coulombs, the department may require adjustment of the concrete mix going forward to improve the chloride penetration resistance.

715.2.3.2 Structures
Replace paragraph one with the following:

(1A) Develop and test each mix to be used for HPC Masonry Structures. Produce a laboratory trial mix for each mix, as well as a trial mix from each plant used to supply the project. Test all mixes at a department-qualified laboratory.

(1B) The laboratory trial mix data must include the results of the following tests:
1. AASHTO T 119 Slump of Hydraulic Cement Concrete.
2. AASHTO T 121 Mass per Cubic Foot, Yield
3. AASHTO T 152 Air Content.
4. AASHTO T 22 Compressive Strength.
5. AASHTO T 277 Rapid Determination of the Chloride Permeability of Concrete, using the modified curing procedure according to standard spec 710.5.7 (2) herein.
6. AASHTO T 309 Temperature.
7. Water Cement Ratio.

(1C) The 28-day compressive strength must be greater than or equal to 4000 psi. The 28-day results of the permeability test must be less than or equal to 1500 coulombs.

Replace paragraph two with the following:

(2) Provide a minimum cementitious content of 470 pounds per cubic yard and a maximum cementitious content of 540 pounds per cubic yard. For all superstructure and substructure concrete, unless the engineer approves otherwise in writing, conform to one of the following:

1. Use class C fly ash or grade 100 or 120 slag as a partial replacement for Portland cement. For binary mixes use 15% to 30% fly ash or 20% to 30% slag. For ternary mixes use 15% to 30% fly ash plus slag in combination. Percentages are stated as percent by weight of the total cementitious material in the mix.
2. Use a type IP or IS blended cement.

60. Temporary Crosswalk Access, Item SPV.0045.200.

A Description

This special provision describes using temporary surface material to maintain accessible crosswalks crossing the construction work zone.

B Materials

Furnish a hard temporary surface material consisting of conveyor belt, asphaltic surface temporary in accordance to standard spec 465, any grade of concrete, skid resistant steel plating, or alternative material as approved by the engineer. Gravel or base course material is not acceptable.

Furnish safety fence in accordance to the article "Fence Safety."

C Construction

Install, maintain, move, and remove temporary surface material at Temporary Crosswalk Access locations as shown on the plans and as directed by the engineer. Level and compact the surface prior to placing temporary surface material. The temporary crosswalk shall have a minimum clear width of 4 feet; be located outside the immediate work area, as approved by the engineer; and meet the requirements of the current Americans with Disabilities Act Accessibility Guidelines (ADAAG). Install safety fence along both sides of the temporary crosswalk. Reconstruct or relay Temporary Crosswalk Access and reset safety fence when disturbed by construction operations or utility trenches.

D Measurement

The department will measure Temporary Crosswalk Access by the day, acceptably completed. The measured quantity will equal the number of calendar days a temporary crosswalk through the work zone is open to pedestrian traffic. A crosswalk is defined as an accessible crossing of a single leg of an intersection. A crossing of a street with an island within the route will be considered a single crosswalk. Each day that the crosswalk is out of service for more than 2 hours will result in one day being deducted from the quantity measured for payment. Undisturbed crosswalks on existing pavement or completed crosswalks on new pavement will not be measured for payment.

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

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0045.200	Temporary Crosswalk Access	Day

Payment is full compensation for furnishing, loading, hauling; for preparing the foundation; for furnishing, placing, maintaining, and removing temporary surface material; for reconstructing or relaying the temporary surface material; and for furnishing, installing, and maintaining safety fence.

61. Manhole 4-Ft Dia. Special, Item SPV.0060.100.

A Description
This item shall be in accordance to the pertinent requirements of standard spec 611 and Quality Management Program (QMP) sections of the standard specifications and shall conform to the construction details shown in the plans.

B Materials
Materials shall be in accordance to standard spec 611.2.

Supply rubber adjustment riser rings for manholes located within the roundabout central island in accordance to the department's Approved Product List.

C Construction
Construction shall be in accordance to standard spec 611.3 and the construction details shown in the plans.

Replace standard spec 611.3.3(1) with the following:

Set inlet cover on rubber adjustment riser ring. Use approved mastic adhesive between the ring and the inlet structure. Use an approved polyurethane adhesive with a flexible set between the ring and the inlet cover. Use two 5/16-inch beads of adhesive placed 1 inch and 2 inches in from the outside edge of the ring. If multiple adjustment rings are necessary, a maximum of two adjustment rings can be used. A maximum of 3 inch adjustment is allowed. Use polyurethane adhesive with a flexible set to join the two rings. If the adjustment rings must be cut, the joints must be staggered and a polyurethane adhesive used to reattach the cut ends. No concrete adjustment rings or mortar is to be placed between the top of the structure and the inlet cover.

D Measurement
The department will measure Manhole 4-Ft Dia. Special as each individual manhole, 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.0060.100	Manhole 4-Ft Dia. Special	Each

Payment is full compensation according to standard spec 611.5, including the rubber adjustment riser rings.

62. Inlet Covers Type D-H, Item SPV.0060.101.

A Description
This item shall be in accordance to the pertinent requirements of standard spec 611 and Quality Management Program (QMP) sections of the standard specifications and shall conform to the construction details shown in the plans.

B Materials
Materials shall be in accordance to standard spec 611.2.

This cover shall consist of a WisDOT standard Type H frame and grate with the curb box removed and replaced with a mountable curb plate meeting the dimensions and specifications shown on the plans, or an equivalent approved by the engineer. The mountable curb plate shall be designed to withstand heavy traffic loading.

C Construction
Construction shall be in accordance to the plans and with standard spec 611.3.

D Measurement
The department will measure Inlet Covers Type D-H as each individual inlet cover, 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.0060.101	Inlet Covers Type D-H	Each

Payment is full compensation according to standard spec 611.5, including the mountable curb plate.

63. Sedimentation Basin, Item SPV.0060.150.

A Description
Design, supply and maintain a sedimentation basin used to de-water the culvert pipes or stormwater ponds.

B (Vacant)

C Construction
Design a sedimentation basin that is able to filter the contaminated water prior to discharging it back into the lake or adjacent drainage way. Wisconsin DNR has technical standard guidelines for sedimentation basin design. Design plans need to reviewed and approved by the engineer prior to installation. Maintain the sedimentation basin at regular intervals or as directed by the engineer.

D Measurement
The department will measure Sedimentation Basin as each individual basin, 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.0060.150	Sedimentation Basin	Each

Payment is full compensation for design and approval; furnishing and maintaining each basin; for any polymers required to achieve performance standards; and for removal of the basin.

64. Pavement Marking Grooved Contrast Preformed Thermoplastic, Arrows Type 1, Item SPV.0060.300; Arrows Type 2, Item SPV.0060.301; Arrows Type 2R, Item SPV.0060.302; Arrows Type 3, Item SPV.0060.303; Arrows Type 3R, Item SPV.0060.304; Words, Item SPV.0060.305; Yield Line 18-Inch, Item SPV.0090.300; Crosswalk 6-Inch, Item SPV.0090.301; 8-Inch, Item SPV.0090.302.

A Description
This special provision describes grooving the pavement surface, and furnishing and installing contrast preformed thermoplastic pavement marking as shown on the plans, in accordance to standard spec 647, and as hereinafter provided.

B Materials
Furnish 125 mils preformed thermoplastic pavement marking from the department's approved products list. If required, furnish sealant material recommended by the manufacturer.

C Construction
C.1 General
For quality assurance, provide the engineer and the region's Marking Section evidence of manufacturer training in the proper placement and installation of preformed thermoplastic pavement marking.

Plane the grooved lines in accordance to the plan details. Use grooving equipment with a free-floating, independent cutting or grinding head. Plane a minimum number of passes to create a smooth groove.

C.2 Groove Depth
Cut the groove to a depth of 120 mils ±10 mils deep from the pavement surface or, if tined, from the high point of the tined surface. Measure depth using a straightedge placed perpendicular to the groove. The department may periodically check groove depths.

C.3 Groove Width – Linear Markings
Cut the groove 1-inch wider than the width of the thermoplastic.

C.4 Groove Position
Position the groove edge in accordance to the plan details.

C.4.1 Linear Marking
Groove at a minimum of 4-inches, but not greater than, 12-inches from both ends of the line segment. Achieve straight alignment with the grooving equipment.

C.4.2 Special Marking
Groove at a minimum of 4-inches from the perimeter of the special marking. Groove separate areas for Word Items.

C.5 Groove Cleaning
C.5.1 Concrete
Cooling the cutting head with water may be necessary for some applications and equipment. If cooling water is necessary, flush the groove immediately with water after cutting to remove any build-up of cement dust and water slurry. If this is not done, the slurry may harden in the groove.

If water is used in the grooving process, allow the groove to dry a minimum of 24 hours after groove cleaning, after removal of excess water, and prior to pavement marking application. Clean and dry the groove for proper application of the sealant, and placement of the pavement marking. Use a high-pressure air blower with at least 185 ft^3/min air flow and 90 psi air pressure to clean the groove; use of the air blower does not decrease the amount of time required for the groove to dry.

C.5.2 Asphalt
Use a high-pressure air blower with at least 185 ft^3/min air flow and 90 psi air pressure to clean the groove.

Check for structural integrity in supporting grooving operations. If the structural integrity of the asphalt pavement is inadequate to support grooving operations, immediately notify the engineer.

C.6 Preformed Thermoplastic Application
Preheat the surface if necessary based on manufacturer's recommendation.

Apply preformed thermoplastic in the groove as per manufacturer's recommendations. If manufacturer's recommendations require a sealant, apply a sealant lower than 91g/l VOC during the following period of time due to Volatile Organic Compound Limitations:

May 1 to September 30, both dates inclusive – the Southeast Region and the ozone non-attainment Northeast Region counties of Sheboygan, Manitowoc, and Kewaunee.

Use any sealant in the remainder counties and for the remainder of the year. The sealant must be wet.

D Measurement
The department will measure Pavement Marking Contrast Grooved Preformed Thermoplastic (Type) by each individual unit, acceptably completed.

The department will not measure Pavement Marking Contrast Grooved Preformed Thermoplastic (Type) (Size). The department will use pay plan quantity according to standard spec 109.1.1.2.

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

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0060.300	Pavement Marking Grooved Preformed Thermoplastic, Arrows Type 1	Each
SPV.0060.301	Pavement Marking Grooved Preformed Thermoplastic, Arrows Type 2	Each
SPV.0060.302	Pavement Marking Grooved Preformed Thermoplastic, Arrows Type 2R	Each
SPV.0060.303	Pavement Marking Grooved Preformed Thermoplastic, Arrows Type 3	Each
SPV.0060.304	Pavement Marking Grooved Preformed Thermoplastic, Arrows Type 3R	Each
SPV.0060.305	Pavement Marking Grooved Preformed Thermoplastic, Words	Each
SPV.0090.300	Pavement Marking Grooved Preformed Thermoplastic, Yield Line 18-Inch	LF
SPV.0090.301	Pavement Marking Grooved Preformed Thermoplastic, Crosswalk 6-Inch	LF
SPV.0090.302	Pavement Marking Grooved Preformed Thermoplastic, 8-Inch	LF

Payment is full compensation for cleaning and preparing the pavement surface; and furnishing and installing the material.

65. Lighting Control Cabinet, Item SPV.0060.350.

A Description
This special provision describes furnishing and installing a Lighting Control Cabinet. Work under this item shall be in accordance to standard spec 651, this special provision, and the plans.

B Materials
Furnish Lighting Control Cabinet from the WisDOT qualified product list.

Furnish load center circuit breakers as follows:

- (1) 15A/1P Controls
- (1) 30A/2P Surge Protection
- (6) 30A/2P Lighting Circuits
- (1) 15A/1P Ramp Gates (Additional breaker required, not controlled by the photocell)

Furnish all necessary wiring, miscellaneous accessories, and hardware as required for a complete and fully operational unit.

C Construction
Install the cabinet and all necessary wiring, miscellaneous accessories, and hardware as required for a complete and fully operational unit.

Follow all manufacturer instructions for installation.

All exposed threaded equipment mounting hardware shall be stainless steel. Coat all threaded stainless steel hardware and dissimilar metal threaded hardware with an approved zinc-based anti-seize compound.

D Measurement
The department will measure Lighting Control Cabinet 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.0060.350	Lighting Control Cabinet	Each

Payment is full compensation for furnishing and installing all materials, including cabinet, wiring, conduits, accessories, hardware and fittings necessary to install the cabinet.

66. Remove Street Light, Item SPV.0060.351.

A Description

This special provision describes removing and salvaging a base mounted light pole, transformer bases, arm(s) and luminaire(s).

B (Vacant)

C Construction

Contact the appropriate personnel (as noted in Street Lighting and Traffic Signal Systems – General Provisions article) at least 7 days prior to removing any street lights on the City of Janesville and WisDOT lighting systems. Arrange a meeting to document the existing condition of all street lighting materials that will be affected by construction activities. The city and WisDOT will provide the following information:

- Identify all items to be salvaged or disposed.
- Identify existing feed-point locations and circuit breaks.

When removing existing street lights, carefully remove and stockpile all equipment at a location approved by the engineer. Place all equipment on blocks so as not to be in direct contact with the ground. Protect luminaires from moisture. Either reinstall lights as the plans show or make available for pick up and salvage. Properly dispose of any equipment that the is not salvaged.

Replace any equipment damaged in the removal process with equipment that is of greater or equal quality than the damaged piece.

City of Janesville street lights may be salvaged and delivered for stockpile at the City of Janesville Service Center, 2200 North USH 51, Janesville, WI, 53546. Contact the city at least 7 days prior to delivery.

D Measurement

The department will measure Remove Street Light 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.0060.351	Remove Street Light	Each

Payment is full compensation for removals, salvage, delivery, stockpile and/or disposal as required above.

67. Reinstall Street Light, Item SPV.0060.352.

A Description
This special provision describes installing a salvaged street light pole, arm and luminaire on a new concrete base. Construction of the new concrete base shall be paid for separately.

B Materials
Use all street lighting materials salvaged from the project except for pole wiring.

C Construction
Reinstall street lights in accordance to the pertinent provisions of standard spec 657 and standard spec 659.

D Measurement
The department will measure Reinstall Street Light 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.0060.352	Reinstall Street Light	Each

Payment is full compensation for installing the salvaged pole, arm, and luminaire.

68. Ramp Closure Gates Hardwired 24-FT, Item SPV.0060.353; Ramp Closure Gates Hardwired 28-FT, Item SPV.0060.354; Ramp Closure Gates Hardwired 30-FT, Item SPV.0060.355; Ramp Closure Gate Arms Stockpile 24-FT, Item SPV.0060.356; Ramp Closure Gate Arms Stockpile 28-FT, Item SPV.0060.357; Ramp Closure Gate Arms Stockpile 30-FT, Item SPV.0060.358.

A Description
This special provision describes providing freeway on-ramp closure gates on type 5 steel luminaire poles, and furnishing and delivering spare gate arms and flashers.

B Materials
B.1 General
Provide five user manuals and a listing of vendors and contact information for each manufactured component including flasher electrical components.

The engineer may allow alternate components equal to the manufactured components this special provision specifies. The engineer may require modification of the plan details to accommodate alternates. If the contractor provides an alternate arm and/or mounting adaptor, the engineer will reject that alternate if the contractor cannot demonstrate, to the engineer's satisfaction, that the department can easily remove and replace the arms.

B.2 Components

Furnish one Poles Type 5-Steel designed to carry twin 15-foot luminaire arms and conforming to standard spec 657 and with dimensions for acceptable installation of the ramp gate hardware as shown on the detail. Ensure a contiguous pole by eliminating the hand hole near base of pole, thus allowing uninhibited mounting of the gate pivot assembly.

Furnish galvanized steel nuts and galvanized bolts conforming to ASTM A307 except where designated as high strength (HS) conform to ASTM A325. For the ramp closure gate locking mechanism, furnish a handle nut to fit on a ¾" bolt (B&B Roadway Part Number 0605P0539 or approved equal).

Furnish grade A36 steel for the gate supports, gate pivot assembly, and associated hardware that is all galvanized after fabrication by either a mechanical or hot-dip process. Grind welded connections, rough edges, and burrs smooth before galvanizing to ensure a finished appearance. Ensure that the galvanized coating conforms to ASTM A 153.

Provide aluminum/fiberglass gate arms of the nominal length the bid item indicates and conforming to plan dimensions. Cover gate arms on two sides with alternating red and white shop-applied type H reflective sheeting conforming to section 637 of the standard specifications. Also provide a shear pin base that is the manufacturer's "permanent pivot" style. Obtain components from:

B&B Roadway
15191 Hwy 243
Russellville, AL 35654
Tel: (888) 560-2060

Gate arm: model MU605

Furnish a worm gear winch with a single line vertical lift capacity of 2000 lbs. Ensure that the winch has hardened steel gears, a handgrip, permanently lubricated bearings, a reinforced arc-welded reel assembly, and mounting plate. Ensure that the winch can be mounted to the winch mount plate shown on the construction details and the handgrip can be operated without conflict with the pole or ramp gate assembly. Furnish a 2 inch outdoor rated, rot resistant polyester strap for the connection between the worm gear winch and the gate arm pivot assembly.

Furnish hardwire power system and connections conforming to the following:

1. Cabinet
   Furnish cabinet assemblies, power wire terminal strips, and power supplies for the on-ramp closure gate systems.

   The cabinet shall be the following dimensions: 9-inches wide, 15-inches high, and 5-inches deep.

   Minimum wall thickness of the aluminum castings shall be 3/16-inch.

   Cabinet body shall have a cast rain hood over the top of the door opening.

   Door shall be manufactured to accept a Corbin No. 2 lock.

   Hinges shall consist of 3/6-inch diameter pins in cast hinge bosses that allow door to swing no less than 180º when open.

   Cabinet shall be capable of being field prepared for top, bottom, or rear mounting and wire entrance holes.

   Set screws shall be stainless steel.

   Assembly shall be water resistant by the door flange in full contact with and compressing a neoprene gasket held by an adhesive to a groove cast into the cabinet body.

   The cabinets shall consist of a cabinet body, door, and latch cast from aluminum alloy 319 or approved equivalent, and a Corbin No. 2 lock. The cast shall be free of voids, pits, dents, molding sand, and excessive foundry grinding marks. All radii shall be smooth and intact. Exterior and interior surfaces shall be smooth and cosmetically acceptable, free of molding fins, cracks, and other blemishes.

   The aluminum shall meet the following minimum requirements:
   Yield Strength – 18 ksi
   Tensile Strength – 27 ksi
   Brinell Hardness – 70
   Elongation (% in 2 inches) – 2

   The assembly shall have an alodine conversion coating to provide corrosion resistance and a proper base for paint adhesion.

   Furnish a stainless steel or anodized steel mounting adapter plate to mount the cabinet to a pole with stainless steel banding straps.

2. Power Converter
   Furnish the cabinet with a 120 VAC to 12 VDC power converter.

   Furnish the cabinet with a 10 position terminal block for the 12 VDC power distribution. Power wire terminal strips 10 position feed-through terminal blocks UL-recognized for No. 22 AWG wire through No. 16 AWG wire and UL-rated for 15 amps. The terminals shall be tin-plated brass with brass clips and clamps.

Furnish gate flasher assemblies conforming to the following:

1. A 2-conductor connector, rated 12 volts at 5 amps minimum.

2. A 2-amp weather resistant in-line fuse and fuse holder.

3. Wiring harness made from 6-conductor 14 AWG stranded insulated control cable.

4. A 12-V flasher controller, capable of providing LED flashers with 5% to 100% duty cycle at a one-second pulse repetition rate.

5. A 4-conductor male/female electrical connector pair, 10 amp capacity for each connection, weather resistant, and mounted to allow rapid gate arm replacement.

6. A 5-amp mercury switch with less than 3 ohms "on" resistance and a 20- to 30-degree activation angle. Mount the switch on the gate arm to activate the flashers when the gate arm is lowered more than 45 degrees from vertical.

7. Furnish red LED flashers meeting the requirements of the MUTCD and/or AREMA standards for hue and brightness.

Power consumption	0.45 amp @ 10.5 V
Life expectancy	100,000 hrs
Directionality	0-degree cone orthogonal to face of flasher
Compliance temperature	-40° C to +70° C

Furnish electrical wires with jackets conforming to the following color scheme throughout the ramp closure gate system:

- Hot = Black or Red
- Neutral = White
- Ground = Green

Furnish structure identification plaques per WisDOT Standard Detail Drawing for Structure Identification Plaques, Ramp Gates, Sign Bridges, Overhead Sign Supports and Traffic Signals.

Furnish a 4-digit combination padlock (Master Lock Model 175DLH or approved equal) for the purpose of preventing unauthorized use of the ramp closure gate system.

C Construction

C.1 Ramp Closure Gates

Under the Ramp Closure Gates bid items, provide ramp closure gate at the locations the plans show. Apply corrosion protection material from the department's approved products list to the interface between the aluminum base and steel pole. The engineer may direct adjustment of the gate arm assembly to ensure the correct vertical and angular orientation of the completed closure gate.

Install cabinet with power supply, flasher controller, and other components. Connect the 120 VAC to 12 VDC power supply to the circuit breaker in the breaker disconnect box. Connect the 120 VAC to 12 VDC power supply to the 10-position terminal block and connect the 12 VDC components to the terminal block.

Connect the 12 VDC terminal strip to the wiring harness through the female side of a 2-terminal polarized electrical connector. Connect male side of this connector to the flasher controller and the female side of a weatherproof polarized 4-conductor electrical connector.

Attach the male side of the 4 conductor electrical connector, mercury switch, wiring harness and the three LED flasher units to the portion of the flasher assembly mounted on the breakaway portion of the gate arm. Adjust mercury switch so that as the gate arm is lowered to a maximum of 45 degrees from the vertical, the gate flasher assembly is energized, and the LEDs begin to flash. Ensure that when the gate arm is raised to a minimum of 15 degrees from vertical, the mercury switches the gate flasher assembly off.

Install structure identification plaques per WisDOT Standard Detail Drawing 12A4.

C.2 Furnishing Gate Arms

Under the Ramp Closure Gate Arms Stockpile bid items, furnish and deliver spare arms of the nominal length the bid item indicates conforming to B.2 of this special provision. Deliver spare gate arms to an address provided by:

Dena Dramm
WisDOT SW Region
(608) 246-5360

D Measurement

The department will measure the Ramp Closure Gates Hardwired (Size) as each individual installation, acceptably completed.

The department will measure the Ramp Closure Gate Arms Stockpile (Size) as each individual unit, acceptably furnished and delivered.

E Payment

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

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0060.353	Ramp Closure Gates Hardwired 24-FT	Each
SPV.0060.354	Ramp Closure Gates Hardwired 28-FT	Each
SPV.0060.355	Ramp Closure Gates Hardwired 30-FT	Each
SPV.0060.356	Ramp Closure Gate Arms Stockpile 24-FT	Each
SPV.0060.357	Ramp Closure Gate Arms Stockpile 28-FT	Each
SPV.0060.358	Ramp Closure Gate Arms Stockpile 30-FT	Each

Payment for the Ramp Closure Gate Hardwired is full compensation for providing ramp closure gates including support poles, gate arm assemblies, guides and collars, gate arms, cabinets, wiring and power converters, and gate flashers.

Payment for the Ramp Closure Gate Arms Stockpile is full compensation for furnishing and delivering ramp closure gate arms.

69. Concrete Control Cabinet Base Type Special, Item SPV.0060.359.

A Description
This special provision describes constructing a concrete base for WisDOT lighting control cabinets.

B Materials
In accordance to standard spec 654.2.

C Construction
In accordance to standard spec 654.3.

D Measurement
The department will measure Concrete Control Cabinet Base Type Special 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.0060.359	Concrete Control Cabinet Base Type Special	Each

Payment is full compensation in accordance to standard spec 654.5.

70. Remove Electrical Service Meter Breaker Pedestal, Item SPV.0060.400.

A Description
This special provision describes removing an in-place electrical service meter breaker pedestal and restoring the site to match the surroundings.

B Materials
Provide all tools and equipment necessary to remove the in-place meter breaker pedestal.

C Construction
Prior to removing the meter breaker pedestal, contact Dena Dramm of the WisDOT SW Region at (608) 246-5360 to arrange for disconnection of the service lateral and salvaging/removal of the meter housing by the electrical utility.

After disconnection of the service lateral and salvaging/removal of the meter housing by the electrical utility, carefully remove the meter breaker pedestal including any base or foundation. Properly dispose of meter breaker pedestal components off WisDOT right-of-way.

Backfill the removal site with material similar to surrounding material and match the surrounding grade.

D Measurement
The department will measure Remove Electrical Service Meter Breaker Pedestal by each individual removed 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.0600.400	Remove Electrical Service Meter Breaker Pedestal	Each

Payment is full compensation for removal, backfill, and disposal as required above.

71. Remove 50-Foot Camera Pole with Lowering System, Item SPV.0060.401.

A Description
This special provision describes removing an in-place camera pole with lowering system.

B Materials
Provide all tools and equipment necessary to remove the in-place camera pole with lowering system.

C Construction
After removing/salvaging pole mounted items associated with other bid items, remove the pole from the concrete footing. Properly dispose of the camera pole and any remaining hardware, cables and wiring off WisDOT right-of-way.

D Measurement
The department will measure Remove 50-Foot Camera Pole with Lowering System by each individual removed 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.0600.401	Remove 50-Foot Camera Pole with Lowering System	Each

Payment is full compensation for removal and disposal as required above.

72. Salvage ITS Field Cabinet, Item SPV.0060.402.

A Description
This special provision describes salvaging an in-place ITS field cabinet.

B Materials
Provide all tools and equipment necessary to salvage the in-place ITS field cabinet.

C Construction
Prior to salvaging, the engineer or delegated representative will inspect the in-place ITS field cabinet for damage. If the in-place ITS field cabinet is found to be damaged, contact Graham Heitz of the WisDOT SW Region at (608) 246-5362.

Carefully salvage the in-place ITS field cabinet at the location indicated on the plans. Salvage all mounting hardware associated with the in-place ITS field cabinet. Remove/salvage cables/wires connected to the in-place ITS field cabinet in accordance to the plans.

Contact Graham Heitz of the WisDOT SW Region at (608) 246-5362 at least 48 hours prior to salvaging the in-place ITS equipment. Proper coordination will allow WisDOT personnel to pick-up salvaged materials with minimal field storage time.

Damage occurring to salvaged equipment during the removal process or between the time of removal and WisDOT pick-up is the responsibility of the contractor. Equipment damaged during the removal process or between the time of removal and WisDOT pick-up will be repaired or the equipment will be replaced at the expense of the contractor.

D Measurement
The department will measure Salvage ITS Field Cabinet as each individual salvaged 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.0060.402	Salvage ITS Field Cabinet	Each

Payment is full compensation for salvaging the ITS field cabinet.

73. Salvage IP Radio, Item SPV.0060.403.

A Description
This special provision describes salvaging an in-place IP radio and associated antenna.

B Materials
Provide all tools and equipment necessary to salvage the in-place IP radio and associated antenna.

Prior to salvaging, the engineer or delegated representative shall determine if the IP radio and associated antenna are fully functional. If the IP radio and/or associated antenna are found to not meet original manufacturer's specifications, contact Graham Heitz of the WisDOT SW Region at (608) 246-5362.

Carefully salvage the in-place IP radio and associated antenna at the location indicated on the plans. If applicable, salvage all mounting hardware associated with the IP radio and associated antenna. Salvage all cables/wires connected to the IP radio and associated antenna back to the next connected device.

Contact Graham Heitz of the WisDOT SW Region at (608) 246-5362 at least 48 hours prior to salvaging the in-place ITS equipment. Proper coordination will allow WisDOT personnel to pick-up salvaged materials with minimal field storage time.

Damage occurring to salvaged equipment during the removal process or between the time of removal and WisDOT pick-up is the responsibility of the contractor. Equipment damaged during the removal process or between the time of removal and WisDOT pick-up will be repaired or the equipment will be replaced at the expense of the contractor.

D Measurement
The department will measure Salvage IP Radio as each individual salvaged 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.0060.403	Salvage IP Radio	Each

Payment is full compensation for salvaging the IP radio and associated antenna.

74. Salvage Camera Assembly, Item SPV.0060.404.

A Description
This special provision describes salvaging an in-place camera assembly.

B Materials
Provide all tools and equipment necessary to salvage the in-place camera assembly.

C Construction
Prior to salvaging, the engineer or delegated representative shall determine if the camera assembly is fully functional. If the camera assembly is found to not meet original manufacturer's specifications, contact Graham Heitz of the WisDOT SW Region at (608) 246-5362.

Carefully salvage the in-place camera assembly at the location indicated on the plans. If applicable, salvage all mounting hardware associated with the camera assembly. Salvage all cables/wires connected to the camera assembly back to the next connected device.

Contact Graham Heitz of the WisDOT SW Region at (608) 246-5362 at least 48 hours prior to salvaging the in-place ITS equipment. Proper coordination will allow WisDOT personnel to pick-up salvaged materials with minimal field storage time.

Damage occurring to salvaged equipment during the removal process or between the time of removal and WisDOT pick-up is the responsibility of the contractor. Equipment damaged during the removal process or between the time of removal and WisDOT pick-up will be repaired or the equipment will be replaced at the expense of the contractor.

D Measurement
The department will measure Salvage Camera Assembly as each individual salvaged 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.0060.404	Salvage Camera Assembly	Each

Payment is full compensation for salvaging the camera assembly.

75. Salvage Video Encoder, Item SPV.0060.405.

A Description
This special provision describes salvaging an in-place video encoder.

B Materials
Provide all tools and equipment necessary to salvage the in-place video encoder.

C Construction
Prior to salvaging, the engineer or delegated representative shall determine if the video encoder is fully functional. If the video encoder is found to not meet original

manufacturer's specifications, contact Graham Heitz of the WisDOT SW Region at (608) 246-5362.

Carefully salvage the in-place video encoder at the location indicated on the plans. If applicable, salvage all mounting hardware associated with the video encoder. Salvage all cables/wires connected to the video encoder back to the next connected device.

Contact Graham Heitz of the WisDOT SW Region at (608) 246-5362 at least 48 hours prior to salvaging the in-place ITS equipment. Proper coordination will allow WisDOT personnel to pick-up salvaged materials with minimal field storage time.

Damage occurring to salvaged equipment during the removal process or between the time of removal and WisDOT pick-up is the responsibility of the contractor. Equipment damaged during the removal process or between the time of removal and WisDOT pick-up will be repaired or the equipment will be replaced at the expense of the contractor.

D Measurement
The department will measure Salvage Video Encoder as each individual salvaged 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.0060.405	Salvage Video Encoder	Each

Payment is full compensation for salvaging the video encoder.

76. Salvage Type 5 Pole, SPV.0060.406.

A Description
This special provision describes salvaging an in-place type 5 pole.

B Materials
Provide all tools and equipment necessary to salvage the in-place type 5 pole.

C Construction
Prior to salvaging, the engineer or delegated representative shall inspect the in-place type 5 pole for damage. If the in-place type 5 pole is found to be damaged, contact Graham Heitz of the WisDOT SW Region at (608) 246-5362.

After removing/salvaging pole mounted items associated with other bid items, carefully salvage the pole from the transformer base at the location indicated on the plans.

Contact Graham Heitz of the WisDOT SW Region at (608) 246-5362 at least 48 hours prior to salvaging the in-place ITS equipment. Proper coordination will allow WisDOT personnel to pick-up salvaged materials with minimal field storage time.

Damage occurring to salvaged equipment during the removal process or between the time of removal and WisDOT pick-up is the responsibility of the contractor. Equipment damaged during the removal process or between the time of removal and WisDOT pick-up will be repaired or the equipment will be replaced at the expense of the contractor.

D Measurement
The department will measure Salvage Type 5 Pole as each individual salvaged 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.0060.406	Salvage Type 5 Pole	Each

Payment is full compensation for salvaging the type 5 pole.

77. Salvage Transformer Base, Item SPV.0060.407.

A Description
This special provision describes salvaging an in-place transformer base.

B Materials
Provide all tools and equipment necessary to salvage the in-place transformer base.

C Construction
Prior to salvaging, the engineer or delegated representative shall inspect the in-place transformer base for damage. If the in-place transformer base is found to be damaged, contact Graham Heitz of the WisDOT SW Region at (608) 246-5362.

Carefully salvage the transformer base at the location indicated on the plans.

Contact Graham Heitz of the WisDOT SW Region at (608) 246-5362 at least 48 hours prior to salvaging the in-place ITS equipment. Proper coordination will allow WisDOT personnel to pick-up salvaged materials with minimal field storage time.

Damage occurring to salvaged equipment during the removal process or between the time of removal and WisDOT pick-up is the responsibility of the contractor. Equipment damaged during the removal process or between the time of removal and WisDOT pick-up will be repaired or the equipment will be replaced at the expense of the contractor.

D Measurement
The department will measure Salvage Transformer Base as each individual salvaged 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.0060.407	Salvage Transformer Base	Each

Payment is full compensation for salvaging the transformer base.

78. Salvage Mounted Controller Microwave Detector Assembly, Item SPV.0060.408.

A Description
This special provision describes salvaging an in-place microwave detector assembly.

B Materials
Provide all tools and equipment necessary to salvage the in-place microwave detector assembly.

C Construction
Prior to salvaging, the engineer or delegated representative shall determine if the microwave detector assembly is fully functional. If the microwave detector assembly is found to not meet original manufacturer's specifications, contact Graham Heitz of the WisDOT SW Region at (608) 246-5362.

Carefully salvage the in-place microwave detector assembly at the location indicated on the plans. If applicable, salvage all mounting hardware associated with the microwave detector assembly. Salvage all cables/wires connected to the microwave detector assembly back to the next connected device.

Contact Graham Heitz of the WisDOT SW Region at (608) 246-5362 at least 48 hours prior to salvaging the in-place ITS equipment. Proper coordination will allow WisDOT personnel to pick-up salvaged materials with minimal field storage time.

Damage occurring to salvaged equipment during the removal process or between the time of removal and WisDOT pick-up is the responsibility of the contractor. Equipment damaged during the removal process or between the time of removal and WisDOT pick-up will be repaired or the equipment will be replaced at the expense of the contractor.

D Measurement
The department will measure Salvage Mounted Controller Microwave Detector Assembly as each individual salavaged 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.0060.408	Salvage Mounted Controller Microwave Detector Assembly	Each

Payment is full compensation for salvaging the microwave detector assembly.

79. Feather Reed Grass (Karl Foerster), CG, 1 Gal., Item SPV.0060.500; Little Bluestem (Blue Heaven), CG, 1 Gal., Item SPV.0060.501; Prairie Dropseed, CG, 1 Gal., SPV.0060.502;Switch Grass (Northwind), CG, 1 Gal., SPV.0060.503; Switch Grass (Shenandoah), CG, 1 Gal., SPV.0060.504.

A Description

This special provision describes furnishing and installing Perennial Plants at the locations shown on the plans and in accordance to the requirements of standard spec 632, the plans, and as hereinafter provided.

B Materials

Provide Perennial Plants, as shown on plan, and complying with American Standard for Nursery Stock (ANSI Z60.1-2004) for type, shape, and height.

Plant Materials

All plants shall be grown within the states of Wisconsin, Minnesota, Michigan, or parts of northern Illinois, Indiana or Ohio located within Zone 5 of the "Plant Hardiness Zone Map" produced by the United States Department of Agriculture, Miscellaneous Publication No. 1475, issued January, 1990, unless otherwise approved by the engineer.

A list of sources for plants shall be furnished in accordance to standard spec 632.2.2.8 before planting begins for fall-planted plants and before March 15 for spring-planted plants. All sources will be subject to verification by the engineer.

Provide type B fertilizer.

C Construction

Ensure that Planting Mixture has been placed according to specifications.

Stake out location of plantings for approval by engineer.

Ensure that the bottom of the hole is adequately compacted to guard against settling. Tamp or water in as necessary to create a condition by which plants will not settle in the planting beds. The bottom of the root ball shall be in direct contact with the bottom of the hole.

Install Perennial Plants and mulching as shown on the plan and as per the standard specifications.

D Measurement
The department will measure Perennials (Type) by 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.0060.500	Feather Reed Grass (Karl Foerster), CG, 1 Gal.	Each
SPV.0060.501	Little Bluestem (Blue Heaven), CG, 1 Gal.	Each
SPV.0060.502	Prairie Dropseed, CG, 1 Gal.	Each
SPV.0060.503	Switch Grass (Northwind), CG, 1 Gal.	Each
SPV.0060.504	Switch Grass (Shenandoah), CG, 1 Gal.	Each

Payment for Perennials bid item is full compensation for providing, transporting, handling, storing, pruning, placing, and replacing plant materials; for excavating all plant holes, salvaging topsoil, mixing, and backfilling; for providing and applying all required fertilizer, mulch, water, rodent protection, herbicides and anti-desiccant spray; and for disposing of all excess and waste materials. Payment for Topsoil bid item used in planting will be as specified in standard spec 625 and Planting Mixture Special.

80. Adjusting Water Valves, Item SPV.0060.650.

A Description
This special provision describes adjusting all existing water valve boxes to finished grade as shown on the plans or as directed by the City of Janesville's representative.

B (Vacant)

C Construction
Excavate and expose the existing water valve boxes to the depth needed to adjust the valve boxes to finished grade. Extensions may be required. Backfill and compaction shall be in accordance to the pertinent sections of the standards specifications. Leave all valve boxes centered over the valve operating nut and free of dirt and debris.

D Measurement
The department will measure Adjusting Water Valves 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.0060.650	Adjusting Water Valves	Each

Payment is full compensation for excavating, adjusting the water valve, backfilling, and compacting.

81. Decorative Medallion B-53-329, Item SPV.0060.700.

A Description
Construct a decorative concrete masonry medallion on the bridge parapet using a form liner, as shown on the plans and hereinafter provided.

B Materials
The City of Janesville will supply the decorative medallion form liner. Contact city engineering Manager Mike Payne at (608) 755-3160.

The contractor, at contractor expense, is responsible for having the form liner repaired or replaced by the manufacturer if any damage to the form liner occurs while in the contractor's possession.

C Construction
Construct the decorative medallion as shown on the plans.

Protect form liner from dirt and debris until needed on work site.

Attach the form liner to the forms in accordance to the manufacturer's installation instructions.

After removing the form liner, clean and return the form liner to the City of Janesville.

D Measurement
The department will not measure Decorative Medallion B-53-329. The department will use pay plan quantity according to standard spec 109.1.1.2.

E Payment
The department will pay for plan quantities according to standard spec 109.1.1.2 at the contract unit price under the
following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0060.700	Decorative Medallion B-53-329	Each

Payment is full compensation for installing and removing the form liner, protecting the form liner from dirt and debris, cleaning the form liner, returning the form liner to the City of Janesville, for constructing the top curved portion of the Decorative Medallion, and for furnishing all labor, tools, equipment, materials and incidentals necessary to construct the Decorative Medallion except as follows:

The department will pay separately for both the concrete masonry for the Decorative Medallion under the bid item Concrete Masonry Bridges as specified in standard spec

502, and the bar steel reinforcement for the Decorative Medallion under the bid item Bar Steel Reinforcement HS Coated Bridges as specified in standard spec 505.

82. Medallion Concrete Staining B-53-329, Item SPV.0060.701.

A Description

This special provision describes furnishing and applying a concrete stain to the exposed concrete formlined medallion surfaces on both faces of the medallion above the parapet on the structure, as detailed in the plans and/or directed by the City of Janesville and as hereinafter provided.

B Materials

B.1 Mortar

Use mortar for sack rubbing the concrete surfaces as given in standard spec 502.3.7.5 or use one of the following products:

Preblended, Packaged Type II Cement:	Tri-Mix by TK Products
	Thoroseal Pearl Gray by Thoro Products

The mortar shall contain one of the following acrylic bonding admixtures mixed and applied in accordance to manufacturer's recommendations.

Acrylic Bonding Admixture:	TK-225 by TK Products
	Achro 60 by Thoro Products
	Achro Set by Master Builders

B.2 Concrete Stain

Use concrete stain manufactured for use on exterior concrete surfaces. Use the following products, or equal, as approved by the department:

Tri-Sheen Concrete Surfacer, Smooth by TK Products
Tri-Sheen Acrylic by TK Products
TK-1450 Natural Look Urethane Anti-Graffiti Primers by TK Products
Safe-Cure and Seal EPX by Chem Masters
H + C Shield Plus by Sherwin-Williams

C Construction

C.1 General

Furnish, prepare, apply, cure, and store all materials in accordance to the product manufacturer's specifications for the type and condition of application required.

Match or exceed the stain manufacturer's minimum recommended curing time of the concrete or 28 days, whichever is greater, prior to staining.

C.2 Preparation of Concrete Surfaces

Provide a sack rubbed finish as given in standard spec 502.3.7.5, using mortar as indicated above, on concrete surfaces with open voids or honeycombing.

Following the sack rubbing, clean all concrete surfaces that are to be coated to ensure that the surface is free of all laitance, dirt, dust, grease, efflorescence, and any foreign material, so that the surface will accept the coating material according to product requirements. As a minimum, clean the surface using a 3000-psi water blast. Hold the nozzle of the water blaster approximately 6-inches from the concrete surface and move it continuously in a sweeping motion. Give special attention to smooth concrete surfaces to produce an acceptable surface texture. Correct any surface problems resulting from the surface preparation methods. Grit blasting of the concrete surface is not allowed.

C.3 Staining Concrete Surfaces
Apply the concrete stain in accordance to the manufacturer's recommendations.

Apply the concrete stain when the temperature of the concrete surface is 45° F or higher, or as given by the manufacturer.
The color of the stain shall be given on the plan. Tint the base coat to match the finish coat; the two coats shall be compatible with each other.

Do not begin staining the formlined concrete medallion surface until this work can begin without receiving damage due to other construction operations. Provide temporary covering protection from overspray or splatter.

C.4 Test Areas
Prior to applying stain to the structure, perform test applications on sample panels that measure a minimum of 48-inches x 48-inches and are constructed to demonstrate workmanship in the use of the form liner specified on the structure. Prior to staining, allow the concrete to cure for the stain manufacturer's minimum recommended curing time or 28 days, whichever is greater. Submit color samples to the department prior to staining the sample panels. Prepare the concrete surfaces of the sample panels and apply stain using the same materials and same manner as proposed for the structure. Do not apply stain to the structure until the department and the City of Janesville approve the test panels.

C.5 Surfaces to be Coated
Apply stain color to the specific area of the formlined concrete medallion surface as shown on the plans and/or as directed by the City of Janesville.

D Measurement
The department will not measure Medallion Concrete Staining B-53-329. The department will use pay plan quantity according to standard spec 109.1.1.2.

E Payment
The department will pay for plan quantities according to standard spec 109.1.1.2 at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0060.701	Medallion Concrete Staining B-53-329	Each

Payment is full compensation for furnishing and applying the coloring system; preparing the concrete surface; and for preparing sample panels.

83. Wet Prairie Native Seed Mix, Item SPV.0085.001; Seeding, Nurse Crop, Item SPV.0085.002.

A Description

This special provision describes the work under this item shall consist of preparing seed beds, furnishing required seed and planting the seed in the areas indicated on the plans in accordance to the pertinent requirements of standard spec 630, and as hereinafter provided.

B Materials

B.1 Wet Prairie Native Seed Mix

Standard spec 630.2.1.5.1.1.1 shall be revised as follows: if substitution of species is required, provide documentation to the engineer for approval prior to purchase. Seed shall be from Wisconsin nurseries specializing in growing native species from Wisconsin genotypes in Zone 5a of the Plant Hardiness Zone Map, Miscellaneous Publication 1475, revised 1990. Possible sources of seeds are listed below:

American Natives
c/o Prairie Nursery
P.O. Box 365
Westfield, WI 53964
(608) 296-2741
Fax: (608) 296-2741

Agrecol Corp
2918 Agriculture Drive
Madison, WI 53718

Bluestem Farm
S5920 Lehman Road
Baraboo, WI 53913

Prairie Ridge Nursery
CRM Ecosystems, Inc.
9738 Overland Road, Route 2
Mt. Horeb, WI 53572
(608) 437-5245
Fax: (608) 437-8982

Prairie Seed Source
P.O. Box 83
North Lake, WI 53064

Little Valley Farm
Route 1, Box 287
Richland Center, WI 53581

Wildlife Nurseries
P.O. Box 2724
Oshkosh, WI 54903-2724

Taylor Creek Restoration Nursery
17921 Smith Road
P.O. Box 256
Brodhead, WI 53520
(608) 897-8641
Fax: (608) 897-8486

Seed for all species in the Wet Prairie Native Seed Mix shall be wild type defined as seed that is directly derived from native wild stock, including seed that was wild collected and placed into production and/or has been harvested directly from native stands.

All seed for the Wet Prairie Native Seed Mix shall be furnished as Pure Live Seed (PLS) unless otherwise approved.

The vendor shall package seed for each species within the Wet Prairie Native Seed Mix and the nurse crop separately. Packages for each species shall contain labels listing the common and scientific names and the net weight of PLS of the species contained therein. The nurse crop shall contain a label listing the common and scientific name, the gross weight and the percent purity and percent germination. The minimum percent purity shall be 90%.

Table of Wet Prairie Native Seed Mix Modal community: Southern Dry Open Woodlands to Sand Barren/Dry Prairie				
	Species	**Common Name**	**Purity and Germ min %**	**Mix Proportions in %**
Forbs	Anemone canadensis	Meadow Anemone	PLS	0.78%
	Asclepias incarnata	Marsh (Red) Milkweed	PLS	3.13%
	Aster novae-angliae	New England Aster	PLS	0.78%
	Aster puniceus	Swamp Aster	PLS	0.78%
	Baptisia leucantha	Wilde White Indigo	PLS	1.56%
	Cassia hebecarpa	Wild Senna	PLS	4.69%
	Eupatorium maculatum	Spotted Joe Pye Weed	PLS	0.78%
	Eupatorium perfoliatum	Boneset	PLS	0.78%
	Helenium autumnale	Sneezeweed	PLS	0.78%
	Heliopsis helianthoides	Early sunflower	PLS	1.17%
	Liatris spicata	Marsh Blazing Star	PLS	0.78%
	Lobelia siphilitica	Great Blue Lobelia	PLS	1.17%
	Monarda fistulosa	Wild Bergamot	PLS	1.56%
	Parthenium integrifolium	Wild Quinine	PLS	0.78%
	Ratibida pinnata	Yellow coneflower	PLS	3.13%
	Silphium terebinthinaceum	Prairie Dock	PLS	0.78%
	Solidago ohioensis	Ohio Goldenrod	PLS	1.17%
	Solidago riddellii	Riddell's Goldenrod	PLS	1.17%
	Verbena hastata	Blue Vervain	PLS	1.17%
	Zizia aurea	Golden Alexanders	PLS	3.13%
	Total Forbs: 20			30.08%

Table of Wet Prairie Native Seed Mix Modal community: Southern Dry Open Woodlands to Sand Barren/Dry Prairie				
	Species	**Common Name**	**Purity and Germ min %**	**Mix Proportions in %**
Grass, Sedges and Rushes	Bromus ciliatus	Fringed Brome	PLS	25.00%
	Carex bebbii	Bebb's Sedge	PLS	1.56%
	Carex stipata	Common Fox Sedge	PLS	2.34%
	Carex vulpinoidea	Brown Fox Sedge	PLS	1.17%
	Elymus virginicus	Virginia Wilde Rye	PLS	36.72%
	Glyceria grandis	Reed Manna Grass	PLS	2.34%
	Scirpus pendulus	Red Bulrush	PLS	0.78%
	Total Graminoids: 7			69.92%
Alternate Forbs	Gentiana andrewsii	Bottle Gentian	PLS	0.00%
	Mimulus ringens	Monkey Flower	PLS	0.00%
	Pycnanthemum virginianum	Mountain Mint	PLS	0.00%
	Solidago graminifolia	Grass-Leaved Goldenrod	PLS	0.00%
	Veronicastrum virginicum	Culver's Root	PLS	0.00%
Alternate Grass, Sedges and Rushes	Carex crawfordii	Crawford Sedge	PLS	0.00%
	Carex crinita	Fringed Sedge	PLS	0.00%
	Carex scoparia	Lance-Fruited Oval Sedge	PLS	0.00%
	Glyceria canadensis	Rattlesnake Grass	PLS	0.00%
	Total Species: 36			

1. Maintain minimum ratio of graminoids to Forbs: 60% to 40% [preferred]
2. Maximum ratio of graminoids to Forbs: 75% to 25%
3. Minimum number of Forbs: 20 species
4. Minimum number of graminoids: 5 species
5. All substitutions to be approved by engineer after consulting with UW Arboretum representative.

B.2 Nurse Crop

The bid item Seeding, Nurse Crop shall be winter wheat or annual ryegrass.

SPECIES	NURSE CROP MINIMUM PURITY (in percent)	MINIMUM GERMINATION (in percent)
Annual Ryegrass	97	90
Winter Wheat	95	90

C Construction

C.1 General

The items of Native Seed Mix and Seeding, Nurse Crop shall be constructed in accordance to standard spec 630.3.

Seed after October 15th and before the first snowfall.

All seed shall be sown in accordance to standard spec 630.3.3.1 (Method A).

Place mulch by Method B as specified in standard spec 627.3.2.2 over all seeded areas.

Subsection 630.3.3.4.1 shall be revised as follows: Use the following sowing rate for seeds in pounds per acre of area:

Native Seed Mix at 20.0 pounds
Nurse Crop at 16.0 pounds

C.2 Seed Establishment Period

The seed establishment period shall extend until August 15, 2015. The seeded areas shall be alive and in satisfactory growth at end of this period. For purpose of establishing acceptable standard, scattered bare spots, none larger than 1 sq feet will be allowed up to maximum of 3% of seeded area.

C.3 Maintenance

Mow all areas seeded with Native Seed Mix during the first week of June 2014 and June 2015 or as soon as possible after those dates if conditions are too wet. Mow vegetation back to 6 inches high in June 2014 and back to 12 inches high in June 2015.

Eradicate the following species from Native Seed Mix areas as soon as they become evident during the seed establishment period:

Musk thistle	Carduus nutans
Spotted knapweed	Centaurea maculosa
Canada thistle	Cirsium arvense
Bull thistle	Cirsium vulgare
Field bindweed	Convolvulus arvensis
Leafy spurge	Euphorbia esula
Sweet clover	Melilotus spp.
Wild Parsnip	Pastinaca sativa
Reed Canary Grass	Phalaris arundinacea

C.4 Qualifications
Sub-contractor shall be a company such as those listed in section B.1 that are proficient in native landscaping installation. Seeding and maintenance shall be performed by personnel familiar with accepted native landscape planting procedures. Qualified foreman, representing the subcontractor, shall be on-site during seeding and maintenance procedures. Submit qualifications to engineer a minimum of two weeks before delivery of materials. Engineer has sole authority to approve or disapprove native landscape subcontractor at engineer's sole discretion.

C.5.1 General
Properly care for planting from the time of planting until final acceptance of the work.

Proper care of plants consists of weeding, re-mulching, and other work necessary to maintain the native plants. The interval is referred to as a care cycle. This interval may lengthen if weather conditions and soil moisture allows with the approval of the engineer. The engineer may order additional watering at any time during the plant establishment period if conditions require.

Keep all mulched areas free of all vegetation, except the specified native plants, by hoeing or by hand weeding

Reseed all areas that meet the bare spot standard described in C.2. during the native plant establishment period at the earliest appropriate planting time after this condition becomes apparent. Provide one person, called the care specialist, responsible for inspecting and performing the required care. Also provide other personnel, vehicles, equipment, tools, and materials needed to accomplish the inspection and care. Have the care specialist do the following:

1. Perform care requirements to the satisfaction of the engineer a minimum of once every two weeks.
2. Notify the engineer at least two days before the beginning of each care cycle.
3. Submit a written report to the engineer after each care cycle. Ensure that the report documents the work performed during the care cycle; the number and location of bare spots, the amount of seed and mulch applied; and other information the engineer or the specialist deems appropriate.

C.5.2 Damages for Failing to Perform
If the care specialist fails to perform any of the required care cycles as specified in C.6.1, the department will assess daily damages in an amount the special provisions specify to cover the cost of performing the work with other forces. The department will assess these damages for each day the requirements of the care cycle remain incomplete, except when the engineer extends the required time period.

C.6 Acceptance or Replacement of Plant Material
Near the end of the applicable native plant establishment period, but not later than August 15, 2015, the engineer will make final inspection of the native planting and accept only those areas conforming to the following minimum requirements:

- Plants are established, upright and green.

- All plants are the species specified unless the engineer approves changes. Conform to C.5, for proper care of plants.

Reseeding native plant materials shall not extend the establishment period.

D Measurement
The department will measure Wet Prairie Native Seed Mix by the pound of seed furnished (PLS or actual) in accordance to standard spec 630.4.

The department will measure Seeding, Nurse Crop by the pound of seed furnished (PLS or actual) in accordance to standard spec 630.4.

E Payment
E.1 General
The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0085.001	Wet Prairie Native Seed Mix	LB
SPV.0085.002	Seeding, Nurse Crop	LB

Payment for the Native Seed Mix and Seeding, Nurse Crop bid items is full compensation for providing, handling, and storing all seed; for furnishing the required culture and inoculating seed as specified; for preparing the seed bed, sowing, covering and firming all seed; for re-seeding for providing and applying all required water; for weeding and mowing, and for disposing of all excess and waste materials.

84. Path Rub Rail, Item SPV.0090.001.

A Description
This special provision describes furnishing and erecting wood rub rails in accordance to the details shown on the plans and as hereinafter provided.

B Materials
Provide lumber in accordance to standard spec 634 and the details shown in the plans.

Provide lag screws and washers in accordance to ASTM Designation A325 and the details shown in the plans.

C (Vacant)

D Measurement
The department will measure Path Rub Rail in length by the linear foot, acceptably completed. No deductions for exposed guard rail bolts will be made.

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

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0090.001	Path Rub Rail	LF

Payment is full compensation for furnishing and installing all materials including treated lumber and hardware.

85. Split Rail Wood Fence Three Rails, Item SPV.0090.002.

A Description
This special provision describes furnishing and installing cedar wood split rail fencing, with three rails, in accordance to the details shown in the plans, at the locations shown on the plans or as designated by the engineer, and as hereinafter provided.

B Materials
Construct all fencing of cedar posts and cedar rails as commonly obtained from most landscape contractors.

C Construction
Space all posts at 10-foot intervals, set a minimum of 30 inches below finished grade, and backfill. Use 12 inches as the spacing between the rails and between the finished ground and lowest rail.

D Measurement
The department will measure Split Rail Wood Fence Three Rails in length by the linear foot, measured center-to-center of end posts, 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.0090.002	Split Rail Wood Fence Three Rails	LF

Payment is full compensation for furnishing and installing all materials including rails, posts and hardware; and for furnishing all maintenance necessary to keep the rails and posts in satisfactory condition.

86. Decorative Railing, Item SPV.0090.003.

A Description

This special provision describes work consisting of fabricating, painting, delivering and installing railings in turf areas where the sidewalk or multi-purpose path is located near a steep slope as shown on the plans.

B Materials

B.1 General

Provide materials meetings the requirements as shown on the plans and the applicable sections of the standard specifications as follows:

Steel Railings:	Standard spec 513.2
Welding Materials:	Standard spec 513.3.6
Painting:	Standard spec 517.2 and 517.3

Prior to fabrication, blast clean steel per SSPC-SP 6 and galvanize steel according to ASTM A 123. Repair zinc coating damaged during fabrication as specified in standard spec 635.3.4. Grind the welded joints to a smooth finish where shown in the plans.

Steel preparation includes the chamfering of sharp edges. Flatten all sharp edges by a single pass of a grinder or suitable device along the sharp edge. Condition any thermal cut edges to be painted before blast cleaning by shallow grinding or other cleaning to remove any hardened surface layer. Remove all evident steel defects exposed in accordance to AASHTO M 160 prior to blast cleaning.

Epoxy paint coating system shall be in accordance to epoxy paint coating system for structural steel, as shown on the department's approved list.

B.2 Painting

Clean all galvanizing surfaces per SSPC-SP1 to remove, chlorides, sulfates zinc salts, oil, dirt, organic matter and other contaminants. The cleaned surface should then be Brush Blast Cleaned per SSPC-SP7 to create a slight angular surface profile (1.0 – 1.5 mils suggested) for adhesion. Blasting should not fracture the galvanized finish or remove any dry film thickness.

After cleaning, provide a tie coat from an approved coating system that is specifically intended to be used on a galvanized surface. The tie coat shall etch the galvanized rail and prepare the surface for the top coat. Apply a top coat matching the specified color. The tie and top coats should be of contrasting colors. Use a pre-approved top coat that is resistant to the effects of the sun, and is suitable for use in a marine environment. The various decorative fence components shall be painted with the tie and top coats before final assembly of the fence panels. Care should be taken to not damage the painted surface during panel assembly or fence installation.

Use one of the qualified paint sources and products given below. An equivalent system may be used with the written approval of the engineer.

Producer	Coat	Products	Dry Film Minimum Thickness (mils)	Minimum Time Between Coats (hours)
Sherwin Williams 1051 Permeter Drive, Suite 710 Schaumburg, IL 60173 (847) 330.1562	Tie	Recoatable Epoxy Primer B67-5 Series/B67V5	2.0 to 4.0	6
	Top	Acrolon 218 HS Polyurethane , B65-650	2.0 to 4.0	NA
Carboline 350 Hanley Industrial St. Louis, MO 63144 (314) 644.1000	Tie	Rustbond Penetrating Sealer FC	1	36
	Top	Carboline 133 LH	4	NA
Wasser Corporation 4118 B Place NW Suite B Aubum, WA 98001	Tie	MC-Ferrox B 100	3.0 to 5.0	8
	Top	MC-Luster 100	2.0 to 4.0	NA

B.2 Color
Provide a finished color for the coating system for railing matching Federal Color 30140.

C Construction
Provide shop drawings in accordance to the requirements of standard spec 506.3.2. Shop drawings shall contain material sizes and types, weld sizes and locations, and all necessary details, dimensions, and information to allow fabrication of the fence in conformance with the requirements of the contract. Do not begin fabrication prior to shop drawing review and acceptance by the engineer.

During construction and at the time of delivery the engineer will inspect the railing sections for proper fabrication and painting. The engineer will accept the product after the delivery is unloaded on the site. After the product is unloaded, the installation contractor shall signify in writing that the railing was received in acceptable condition per the engineer's inspection. Any damage to the railing after the acceptable delivery will be the responsibility of the installation contractor.

Complete all welding in accordance to the applicable requirements of standard spec 506. No field welding, field cutting, or drilling will be permitted without the approval of the engineer.

Take special care during construction to minimize the number and size of touch-up spots. Follow the manufacturer's recommendations for damaged area repairs. The engineer will approve the field paint appearance prior to final acceptance.

Provide the engineer with the name, address, and phone number of a representative of the railing fabricator for coordination.

During handling, protect finish coating from damage. If damaged during handling the railing may be rejected by the engineer or engineer may direct fabricator that the finish shall be repaired in accordance to the manufacturer's recommendations.

D Measurement
The department will measure Decorative Railing, by the linear foot, 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.0090.003	Decorative Railing	LF

Payment is full compensation for providing, fabricating, transporting and erecting the railing; for providing and placing shims, masonry anchor bolts and concrete base; and for coating and painting.

87. Concrete Curb and Gutter 24-Inch, Item SPV.0090.004; Concrete Curb and Gutter OSOW, Item SPV.0090.005; Concrete Curb and Gutter 2-Inch Sloped 36-Inch Type R, Item SPV.0090.006.

A Description
This item shall be in accordance to the pertinent requirements of standard spec 601 and Quality Management Program (QMP) sections of the standard specifications and shall conform to the construction detail shown in the plans.

B Materials
The concrete curb and gutter shall be in accordance to the pertinent materials of standard spec 601.

C Construction
Perform work in accordance to standard spec 601.

D Measurement
The department will not measure Concrete Curb and Gutter 24-Inch, Concrete Curb and Gutter OSOW, and Concrete Curb and Gutter 2-Inch Sloped 36-Inch Type R. The department will use pay plan quantity according to standard spec 109.1.1.2.

E Payment
The department will pay for plan quantities according to standard spec 109.1.1.2 at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0090.004	Concrete Curb and Gutter 24-Inch	LF
SPV.0090.005	Concrete Curb and Gutter OSOW	LF
SPV.0090.006	Concrete Curb and Gutter 2-Inch Sloped 36-Inch Type R	LF

Payment is full compensation for excavating and preparing the foundation; for providing all materials, including concrete, and expansion joints; placing, finishing, protecting and curing concrete; and for sawing joints.

88. Pavement Marking Grooved Wet Reflective Contrast Tape 12-Inch, Item SPV.0090.303.

A Description

This special provision describes furnishing, grooving and installing preformed wet reflective pavement marking contrast tape for grooved applications as shown on the plans, according to standard spec 646, and as hereinafter provided.

B Materials

Furnish wet reflective pavement marking contrast tape and adhesive material, per manufacturer's recommendation if required, from the department's approved products list.

Furnish a copy of the manufacturer's recommendations to the engineer before preparing the pavement marking grooves.

C Construction

C.1 General

For quality assurance, provide the engineer and the region's Marking Section evidence of manufacturer training in the proper placement and installation of pavement marking contrast tape.

Plane the grooved lines according to details in the plan and per manufacturer's recommendations. Use grooving equipment with a free-floating, independent cutting head. Plane a minimum number of passes to create a grooved surface per manufacturer's recommendations.

C.2 Groove Depth

Cut the groove to a depth of 120 mils ± 10 mils from the pavement surface or, if tined, from the high point of the tined surface. To measure the depth, the contractor may use a depth plate placed in the groove and a straightedge placed across the plate and groove, or the contractor may use a straightedge placed perpendicular to the groove. The department may periodically check groove depths.

C.3 Groove Width – Longitudinal Markings

Cut the groove one-inch wider than the width of the tape.

C.4 Groove Position
Position the groove edge according to plan details. Groove a minimum of 4 inches, but not greater than, 12 inches from both ends of the tape segment. Achieve straight alignment with the grooving equipment.

C.5 Groove Cleaning
C.5.1 Concrete
Cooling the cutting head with water may be necessary for some applications and equipment. If cooling water is necessary, flush the groove immediately with high-pressure water after cutting to remove any build-up of cement dust and water slurry. If this is not done, the slurry may harden in the groove.

If water is used in the grooving process, allow the groove to dry a minimum of 24 hours after groove cleaning, and prior to pavement marking application. The groove surface shall be clean and dry before applying the adhesive, and the pavement marking tape. Use a high-pressure air blower with at least 185 ft^3/min air flow and 120 psi air pressure to clean the groove; use of the air blower does not decrease the amount of time required for the groove to dry.

C.5.2 New Asphalt
Groove pavement five or more days after paving.

Use a high-pressure air blower with at least 185 ft^3/min air flow and 90 psi air pressure to clean the groove.

C.5.3 Existing Asphalt
Check for structural integrity in supporting grooving operations. If the structural integrity of the asphalt pavement is inadequate to support grooving operations, immediately notify the engineer.

Use a high-pressure air blower with at least 185 ft^3/min air flow and 90 psi air pressure to clean the groove.

C.6 Tape Application
Apply the tape when both the air and surface temperature are 40 degrees F and rising.

Apply tape in the groove as per manufacturer's recommendations. If manufacturer's recommendations require surface preparation adhesive

- For the Southeast Region and the ozone non-attainment Northeast Region counties of Sheboygan, Manitowoc, and Kewaunee:
    - Apply SPA-60 during May 1 to September 30, both dates inclusive due to Volatile Organic Compound Limitations.
    - Apply P-50 during October 1 to April 30, both dates inclusive.

- For the remainder counties:
  - Apply either adhesive.

Refer to the manufacturer's instructions for determining when the surface preparation adhesive is set.

Tamp the wet reflective pavement marking contrast tape with a tamper cart roller, with a minimum of a 200-lb load, cut to fit the groove. Tamp a minimum of three complete cycles (6 passes) with grooved modified tamper roller cart.

D Measurement
The department will not measure Pavement Marking Grooved Wet Reflective Contrast Tape, 12-Inch. The department will use pay plan quantity according to standard spec 109.1.1.2.

E Payment
The department will pay for plan quantities according to standard spec 109.1.1.2 at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0090.303	Pavement Marking Grooved Wet Reflective Contrast Tape 12-Inch	LF

Payment is full compensation for cleaning and preparing the pavement surface; furnishing and installing the material; and for removing temporary pavement marking, if necessary.

89. Shovel Cut Edging, Item SPV.0090.500.

A Description
This special provision describes furnishing and installing a Shovel Cut Edging at the locations shown on the plans and as hereinafter provided.

B Materials
Provide Shredded Hardwood Bark Mulch Special for trench backfill as shown on plan and in accordance to these SPV sections.

C Construction
Install shovel cut edge at the perimeter of planting beds as indicated in Drawings. Edge shall be manually or machine cut to a minimum depth of 6" and a width of 6-8". Fill shovel cut edge with shredded hardwood bark mulch and finish approximately 2" below adjacent lawn grades. Tamp shredded hardwood bark mulch lightly and add mulch, as necessary, such that the final level of the shredded hardwood bark mulch after compacting shall be level with adjacent lawn grades.

D Measurement
The department will measure Shovel Cut Edging by the linear foot, 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.0090.500	Shovel Cut Edging	LF

Payment is full compensation for furnishing and installing all materials (shredded hardwood bark mulch).

90. Concrete Pavement Joint Layout, Item SPV.0105.001.

A Description
This special provision describes designing the joint layout and staking the location of all joints on the project, including mainline, ramps and intersections (traditional and roundabouts) to accommodate the concrete paving operation.

B (Vacant)

C Construction
Design the joint layout and stake the location of all joints on the project, including mainline, ramps and intersections (traditional and roundabouts), to accommodate the concrete paving operation. Plan and set all points necessary to establish the horizontal position of the transverse and longitudinal joints in the concrete pavement in accordance to the plans, the American Concrete Pavement Association Intersection Joint Layout Guidelines, and as directed by the engineer. Establish the joint layout in a manner to best-fit field conditions, construction staging, the plan, and as directed by the engineer.

D Measurement
The department will measure Concrete Pavement Joint Layout as a single complete lump sum unit of work, completed in accordance to the contract and accepted,.

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

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0105.001	Concrete Pavement Joint Layout	LS

Payment is full compensation for designing the joint layout on the mainline, ramps and all traditional and roundabout intersections; for completing all surveying work necessary to locate all transverse and longitudinal joints; and for making adjustments to match field conditions and construction staging.

91. Survey Project 1001-03-74, Item SPV.0105.002.

A Description
Perform work according to standard spec 105.6 and standard spec 650 and as hereinafter modified.

Standard spec 105.6 and 650 are modified to define the requirements for construction staking for this contract.

Add the following to standard spec 105.6.1:

Horizontal and vertical control points, provided by the department, are generally at 1-mile intervals for horizontal control and at ½-mile intervals for vertical control. Control points will be provided as a hard copy and in ASCII electronic format.

Replace standard spec 105.6.2 with the following:

The department will not perform any construction staking for this contract. The contractor shall perform all survey required to layout and construct the work under this contract, subject to engineer's approval.

The survey includes establishing horizontal and vertical position for all aspects of construction including but not limited to storm sewer, subgrade, base, curb, gutter, curb and gutter, pipe culverts, structure layout, pavement, barriers (temporary and permanent), electrical installations, supplemental control, slope stakes, ponds, ITS, FTMS, ramp gates, parking lots, utilities, landscaping elements, irrigation system layout, installation of community sensitive design elements, traffic control items, fencing, etc.

The department may choose to perform quality assurance survey during construction. This quality assurance survey does not relieve the contractor of the responsibility for furnishing all survey work required under this contract.

Delete standard spec 650.1.

B (Vacant)

C Construction
Survey required under this item shall be in accordance to all pertinent requirements of standard spec 650 and shall include all other miscellaneous survey required to layout and construct all work under this contract.

D Measurement
The department will measure Survey Project 1001-03-74 as a single lump sum unit of work, 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.0105.002	Survey Project 1001-03-74	LS

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

92. Electrical Service Meter Breaker Pedestal Special (CB 100), Item SPV.0105.360.

A Description
Perform work in accordance to the requirements of standard spec 656, the plans, standard detail drawings, and as hereinafter provided.

B Materials
In accordance to the plans and standard spec 656.2 and as hereinafter provided:

Amend standard spec 656.2.3, Meter Breaker Pedestal Service, by adding the following paragraphs:

(2) Furnish meter pedestal with provisions for a minimum of two 30A double-pole breakers in a water-tight outdoor rated enclosure. Furnish and install breakers as required.

(3) Furnish stainless steel square tubing, concrete masonry and steel reinforcement as the plans show for rigidly mounting the meter pedestal.

C Construction
In accordance to the plans and standard spec 656.3 and as hereinafter provided:

Obtain a City of Janesville Electrical Permit from the Housing, Building, and Neighborhood Services Department prior to performing any work. Pay all permit fees.

Ensure that electrical service is installed and energized a minimum of one week prior to the system activation deadline.

D Measurement
The department will measure Electrical Service Meter Breaker Pedestal Special as a single lump sum unit of work for each service, acceptably completed.

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

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0105.360	Electrical Service Meter Breaker Pedestal Special (CB 100)	LS

Payment is full compensation for furnishing and installing all materials; for excavation, backfill, and disposal of surplus materials.

93. Remove and Reinstall Traffic Signals (Racine Street and Palmer Drive), Item SPV.0105.450; Remove and Reinstall Traffic Signals (STH 11 and Midland Road), Item SPV.0105.451.

A Description

This special provision describes removing and reinstalling existing traffic signal equipment in accordance to the plans and as hereinafter provided. Additional specific removal items are noted in the plans.

B Materials

This item includes the removal and reinstallation of existing traffic signal equipment only. Items included under this bid item include transformer/pedestal bases, monotube poles and arms, poles, standards, signal heads, backplates, signal mounting hardware, traffic signal cabinets, emergency vehicle preemption equipment, luminaire arms and luminaires.

C Construction

Arrange for the de-energizing of the traffic signals with the local electrical utility after receiving approval from the engineer that the existing traffic signals can be removed.

Contact the appropriate personnel (as noted in Street Lighting and Traffic Signal Systems – General Provisions article) at least 7 days prior to the removal of the traffic signals. Complete the removal work as soon as possible following shut down of this equipment.

The department assumes that all equipment is in good condition and in working order prior to the contractor's removal operation. Prior to removal, inspect and provide a list of any damaged or non-working traffic signal equipment to the engineer. Any equipment not identified as damaged or not working, prior to removal, will be replaced by the contractor at no cost to the department.

Remove and/or salvage existing cables and wiring as required. Salvage and retain all cables and wiring unless construction activities require reconstruction of an existing section of conduit. Remove cables and wiring from sections of conduit which are to be removed. Quantities for new cable and wire are included for new relocated bases and sections of conduit only.

Remove all standards and poles per plan from their concrete footings and disassemble out of traffic. Remove the transformer bases from each pole. Remove the emergency vehicle preemption heads (evp) from each signal standard or pole. Ensure that all access hand

hole doors and all associated hardware remain intact. Dispose of the underground signal cable, internal wires and street lighting cable off the state right-of-way.

Reinstall all items in accordance to the pertinent provisions of standard spec 657, standard spec 658 and standard spec 659.

D Measurement
The department will measure Remove and Reinstall Traffic Signals (Location) as a single lump sum unit of work for each intersection, 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.0105.450	Remove and Reinstall Traffic Signals (Racine Street and Palmer Drive)	LS
SPV.0105.451	Remove and Reinstall Traffic Signals (STH 11 and Midland Road)	LS

Payment is full compensation for removing, disassembling traffic signals, scrapping of some materials, disposing of scrap material, for delivering the requested materials to the department, and incidentals necessary to complete the contract work.

94. Temporary Vehicle Detection (STH 11 and Midland Road), Item SPV.0105.452; Temporary Vehicle Detection (STH 11 and Temporary Northbound Ramp – Stage 2), Item SPV.0105.453; Temporary Vehicle Detection (STH 11 and Temporary Northbound Ramp – Stage 3), Item SPV.0105.454; Temporary Vehicle Detection (STH 11 and Temporary Southbound Ramp – Stage 2), Item SPV.0105.455; Temporary Vehicle Detection (STH 11 and Temporary Southbound Ramp – Stage 3), Item SPV.0105.456; Temporary Vehicle Detection (Racine Street and Palmer Drive), Item SPV.0105.457.

A Description
This special provision describes furnishing, installing and maintaining vehicle detection systems in conjunction with temporary traffic signals as shown in the plans. The desired vehicle detection zones and their operational parameters are show in the plans.

B Materials
Provide all necessary equipment for the approved method of temporary vehicle detection.

Select, with prior approval of the engineer, the vehicle detection technology best suited for the site conditions and the anticipated construction work zones and activities. The engineer reserves the right to request a demonstration of any or all temporary vehicle detection technologies prior to said approval. Vehicle detection technologies considered

shall include; but are not limited to, temporary inductive loops, microwave detection, or video detection. Detection technology shall provide for true presence detection.

C Construction

Damage to new pavement for temporary detection loops will not be allowed. Any pavement damaged during installation shall be replaced at the contractor's expense.

Provide immediate response, 24-hour/7-days per week, to maintain any aspect of the temporary vehicle detection that is defective, completing repairs or adjustments the same day as notification.

Adjust, relocate, add, or remove temporary vehicle detection equipment for each traffic control stage or sub stage as shown in the plans, request by the engineer, or as modified by the contractor's operations to maintain the required traffic and complete the proposed work.

D Measurement

The department will measure Temporary Vehicle Detection (Intersection), as a single lump sum unit of work, 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.0105.452	Temporary Vehicle Detection (STH 11 and Midland Road)	LS
SPV.0105.453	Temporary Vehicle Detection (STH 11 and Temporary Northbound Ramp – Stage 2)	LS
SPV.0105.454	Temporary Vehicle Detection (STH 11 and Temporary Northbound Ramp – Stage 3)	LS
SPV.0105.455	Temporary Vehicle Detection (STH 11 and Temporary Southbound Ramp – Stage 2)	LS
SPV.0105.456	Temporary Vehicle Detection (STH 11 and Temporary Southbound Ramp – Stage 3)	LS
SPV.0105.457	Temporary Vehicle Detection (Racine Street and Palmer Drive)	LS

Payment is full compensation for demonstrating and selecting the vehicle detector technology, furnishing, installing and adjusting or moving the equipment, including all required materials, tools and supplies; and for clean-up and waste disposal.

95. Building Renovation, General Construction, Item SPV.0105.600.

A Description

This item consists of the general construction work for the field office building renovation. Perform this work in accordance to the General Requirements for Building Construction article, the applicable plans, and following specifications.

Technical Specifications
Technical specifications that apply to this item include:

DIVISION 1
Section 010000 General Requirements
Section 012500 Substitution Procedures
Section 013200 Construction Progress Documentation
Section 013300 Submittals
Section 016000 Product Requirements
Section 017329 Cutting and Patching
Section 017700 Closeout Procedures
Section 017823 Operations and Maintenance Data
Section 017839 Project Record Documents
Section 017900 Demonstration and Training

DIVISION 2 – SITE CONSTRUCTION
Section 024119 Selective Demolition

DIVISION 3 – SITE CONSTRUCTION
Section 033000 Cast in Place Concrete

DIVISION 7 – THERMAL AND MOISTURE PROTECTION
Section 074213 Formed Metal Wall Panels

DIVISION 8 – DOORS AND WINDOWS
Section 081113 Hollow Metal Doors and Frames
Section 081416 Flush Wood Doors
Section 085113 Aluminum Windows
Section 087100 Door Hardware

DIVISION 9 – FINISHES
Section 092216 Non-Structural Metal Framing
Section 092900 Gypsum Board
Section 093000 Tiling
Section 095213 Acoustical Tile Ceilings
Section 096519 Resilient Tile Flooring
Section 096813 Tile Carpeting
Section 098436 Sound Absorbing Ceiling Units
Section 099123 Interior Painting

DIVISION 10 – SPECIALTIES
Section 102113 Toilet Compartments
Section 102238 Operable Panel Partitions
Section 102800 Toilet, Bath and Laundry Accessories

DIVISION 12 – FURNISHINGS
Section 122116 Vertical Louver Blinds
Section 123216 Manufactured Plastic Laminate Faced Casework
Section 123661 Simulated Stone Countertops
Section 125900 Systems Furniture

DIVISION 13 – SPECIAL CONSTRUCTION
Section 134400 Mezzanine Systems

B (Vacant)

C (Vacant)

D Measurement
The department will measure Building Renovation, General Construction as a single lump sum unit of work, 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.0105.600	Building Renovation, General Construction	LS

Payment is full compensation for furnishing all materials and equipment; and for supplying all labor, tools, equipment; and incidentals necessary to complete the work.

96. Building Renovation, Plumbing, Item SPV.0105.601.

A Description
This item consists of the plumbing work for the field office building renovation. Perform this work in accordance to the General Requirements for Building Construction article, the applicable plans and following specifications.

Technical Specifications
Technical specifications that apply to this item include:

DIVISION 21 – FIRE SUPPRESSION
Section 210500 Common Work Results for Fire Suppression
Section 210529 Hangers and Supports for Fire Suppression Piping and Equipment
Section 211000 Water Based Fire Suppression Systems

DIVISION 22 – PLUMBING
Section 220500 Common Work Results for Plumbing
Section 220514 Plumbing Specialties
Section 220523 General Duty Valves for Plumbing Piping
Section 220529 Hangers and Supports for Fire Suppression Piping and Equipment
Section 220700 Plumbing Insulation
Section 221100 Facility Water Distribution
Section 221300 Facility Sanitary Sewerage
Section 224200 Commercial Plumbing Fixtures

B (Vacant)

C (Vacant)

D Measurement
The department will measure Building Renovation, Plumbing as a single lump sum unit of work, 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.0105.601	Building Renovation, Plumbing	LS

Payment is full compensation for furnishing all materials and equipment; and for supplying all labor, tools, equipment; and incidentals necessary to complete the work.

97. Building Renovation, Heating and Ventilation, Item SPV.0105.602.

A Description
This item consists of the heating and ventilation work for the field office building renovation. Perform this work in accordance to the General Requirements For Building Construction article, the applicable plans, and following specifications.

Technical Specifications
Technical specifications that apply to this item include:

DIVISION 23 – HVAC
Section 230500 Common Work Results for Plumbing
Section 230513 Common Motor Requirements for HVAC Equipment
Section 230529 Hangers and Supports for Fire Suppression Piping and Equipment
Section 230593 Testing, Adjusting, and Balancing for HVAC
Section 230700 HVAC Insulation
Section 232300 Refrigerant Piping
Section 233100 HVAC Ducts and Casings
Section 233400 HVAC Fans
Section 233600 Air Terminal Units

Section 233713 Diffusers, Registers and Grilles
Section 234100 Particulate Air Filtration
Section 237433 Dedicated Outdoor Air Units - AHU-6

B (Vacant)

C (Vacant)

D Measurement
The department will measure Building Renovation, Heating and Ventilation as a single lump sum unit of work, 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.0105.602	Building Renovation, Heating and Ventilation	LS

Payment is full compensation for furnishing all materials and equipment; and for supplying all labor, tools, equipment; and incidentals necessary to complete the work.

98. Building Renovation, Electrical, Item SPV.0105.603.

A Description
This item consists of the electrical work for the field office building renovation. Perform this work in accordance to the General Requirements For Building Construction article, the applicable plans and following specifications.

Technical Specifications
Technical specifications that apply to this item include:

DIVISION 26 – ELECTRICAL
Section 260500 Common Work Results for Electrical
Section 260502 Electrical Demolition for Remodeling
Section 260504 Cleaning, Inspection, and Testing of Electrical Equipment
Section 260519 Low-Voltage Electrical Power Conductors and Cables
Section 260526 Grounding and Bonding for Electrical Systems
Section 260529 Hangers and Supports for Electrical Systems
Section 260533 Raceway and Boxes for Electrical Systems
Section 260553 Identification for Electrical Systems
Section 262416 Panelboards
Section 262702 Equipment Wiring Systems
Section 262726 Wiring Devices
Section 262728 Disconnect Switches
Section 262813 Fuses

Section 262900 Low Voltage Controllers
Section 263600 Transfer Switch
Section 264313 Surge Protective Devices for Low Voltage Electrical Power Circuits

DIVISION 27 – ELECTRICAL
Section 271000 Structured Cabling
Section 275116 Public Address

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY
Section 280500 Common Work Results for Electronic Safety and Security
Section 280513.16 Conductors and Cables for Electronic Safety and Security
Section 280528.29 Hangers and Supports for Electronic Safety and Security
Section 280528.33 Conduits and Boxes for Electronic Safety and Security
Section 280528.39 Surface Raceway for Electronic Safety and Security
Section 280553 ID for Electronic Safety and Security
Section 281300 Access Control
Section 283100 Fire Detection and Alarm

B (Vacant)

C (Vacant)

D Measurement
The department will measure Building Renovation, Electrical as a single lump sum unit of work, 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.0105.603	Building Renovation, Electrical	LS

Payment is full compensation for furnishing all materials and equipment; and for supplying all labor, tools, equipment; and incidentals necessary to complete the work.

99. Stormwater Treatment Filter Strip, Item SPV.0165.001.

A Description
This special provision describes the construction of Stormwater Treatment Filter Strips per the plan detail, as directed by the engineer, and as hereinafter provided.

B Materials
Sand shall be poorly graded with less than 5% fines (USCS classification SP) and as defined in the following table.

Sieve	Maximum Percent Passing
No. 4	100%
No. 10	90%
No. 40	10%
No. 200	5%

C Construction

Undercut or underfill all areas designated for filter strips to a degree that if covered with the specified depth of sand and topsoil, the finished work conforms to the required lines, grades, slopes, and cross sections the plans and drawings show. Place sand to the depth specified in the plans, then place topsoil to the minimum depth required in the contract. Use tracked equipment with a track pressure no greater than 4.5 psi.

Subsoiling is the practice of dragging tines, shanks or claws through soil to a depth of approximately 20 inches to loosen and mix the soil layers. Subsoil the filter strip areas after topsoil placement. Schedule a 50-foot long test section and demonstrate competence to the engineer prior to continuing operations. The engineer shall identify the test area. Loosen subsoiled areas to a depth of 20 inches including the in-place material, sand and topsoil. After obtaining approval by the engineer that the equipment and methods are sufficient to obtain the desired results, complete the subsoiling operation. Subsoiling done without the engineer's approval will be considered as unauthorized work.

Subsoil each filter strip area three times to mix the topsoil, sand and in-place material. Do not pull the shanks through previous channels, but instead create multiple channels in the filter strip. Work at right angles to the direction of surface drainage. Create channels by a commercially available, multi-shanked implement attached to track-type equipment. The equipment shall be capable of exerting a penetration force necessary for the site. No disc cultivators, chisel plows, or spring-loaded equipment will be allowed. Space the grid channels 24 to 30 inches apart, depending on equipment, site conditions, and the plan. The channel depth shall be a minimum 20 inches. If soils are saturated, delay operations until the soil moisture is at field capacity or less. Field capacity is the amount of water retained in the soil after it has been saturated and allowed to drain freely.

Upon completion and acceptance of the subsoiled area, finish grade surface as described in standard spec 625.3.3 (2) and (4), except that only light-weight equipment, as approved by the engineer, may be used to break down clods and lumps. Drive no other equipment over the subsoiled area after the filter strip is finish-graded. Any filter strip areas that become compacted due to the contractors operations, must be subsoiled and finish-graded at no expense to the department.

Seed, fertilize and mulch the filter strip immediately after final grading. Place safety fence on the upgradient side of the filter strip, offset by one foot away from the filter strip immediately after seeding and mulching. Remove the safety fence only after all construction activities in the general area of the filter strip have been completed.

D Measurement
The department will measure Stormwater Treatment Filter Strips by the square foot, 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.0165.001	Stormwater Treatment Filter Strips	SF

Payment is full compensation for constructing the filter strip including furnishing and placing the sand; and for subsoiling. The department will pay for safety fence under the Fence Safety bid item.

100. Colored Concrete Sidewalk 5-Inch, Item SPV.0165.500.

A Description
This special provision describes the construction of colored concrete sidewalk, on a prepared foundation and shall be in accordance to the pertinent requirements of standard spec 602 and Quality Management Program (QMP) sections.

B Materials
The colored concrete sidewalk shall be in accordance to the pertinent materials of standard spec 602.

B.1 Concrete
Furnish concrete conforming to standard spec 501 and as hereinafter provided:

Integrally color the concrete using non-fading synthetic iron oxides conforming to ASTM C979 at a minimum percent loading of 6% and a maximum percent loading of 8% by weight of the cementitious materials in the mix.

Match the concrete color to the Federal Standard 595 Color FS 30140. The department and the City of Janesville will accept the color based on contractor supplied comparison sample panels as hereinafter provided.

Add integral concrete colorant according to manufacturer's instructions.

Maintain mix characteristics for all colored concrete requiring a matching finish. Use the same source, brand, type; and color of portland cement, supplementary cementitious materials, aggregates and admixtures for colored concrete pavement throughout the project. Use constant cement content, supplementary cementitious material content. Except for minor adjustments, maintain a constant water/cementitious materials ratio.

B.2 Concrete Curing
Supply a liquid membrane-forming clear curing compound conforming to AASHTO M 148, type 1. Apply curing compound for integrally colored concrete

according to manufacturer's instructions using manufacturer's recommended application techniques. Apply curing compound at a standard time after each pour.

B.3 Admixtures
Use admixtures designed for use and compatible with colored concrete pigments. Do not use calcium chloride or admixtures containing chlorides. Use the same admixtures for colored concrete pavement throughout the project.

C Construction
Construct colored concrete sidewalk in accordance to standard spec 602 and as hereinafter provided. Obtain colored concrete mix approval from the engineer prior to placing the colored concrete sidewalk by documenting mixture proportions and submitting a sample panel.

C.1 Documentation and Mixture Proportions
Perform preliminary laboratory and/or field trial batching to establish the mix proportions necessary to meet the final concrete characteristics.

Provide documentation for the colored concrete to the engineer as follows:

1. Project ID.
2. Proposed locations for the colored concrete.
3. Mix proportions: quantities per cubic yard expressed as SSD weights and net water, water to cementitious material ratio, air content, and 28-day or earlier compressive strength.
4. Materials: type, brand, and source.
5. Sample panel: Provide a finished colored concrete sample having minimum dimensions of 2 feet by 2 feet by 2 inches (length, width, thickness). Up to five sample panels may be submitted to the engineer to demonstrate the typical texture, surface finish, color, and color intensities available.
6. Use consistent mix proportions, material type, brand and source, including admixtures, for the entire duration of the project for the colored concrete mix design.

C.2 Trial Batch
Upon engineer approval of a sample panel, construct a field test panel. Notify the engineer seven days in advance by providing the dates and times for field test panel construction,

At an engineer-determined location on the project construct a field test panel. Place and finish a 10-foot by 5-foot by 4-inch colored concrete field test panel using processes and techniques intended for use on permanent work, including curing procedures. Produce the field test panel using the same workers who will perform the contract work. Retain samples of cements, sands, aggregates and color additives used in the field test panel for comparison with materials used in remaining work. For an accurate representation of the desired color or color intensity, produce the colored concrete for the test panel in full cubic yard increments. Properly dispose of excess material.

The engineer will determine acceptance of the test panel color and finish by comparing the field test panel to the contractor's previously supplied sample panel. Upon acceptance from the engineer, the field test panel will act as the visual quality standard for the finished permanent work. Remove the field test panel as directed by the engineer.

Submit to the engineer any revisions to subsection C.l for the final mix design.

C.3 Placement

Produce consistent colored concrete mixes. Except as required to maintain constant color, the engineer will not allow variations in the amounts, types, or source of materials. The contractor may make minor adjustments of water and air-entraining agent as field conditions dictate. Other changes to the colored concrete mixture proportions shall require the contractor to repeat the mix approval process.

Colored concrete mixes for the entire project shall be consistent. If the contractor chooses to provide mixes with High Early Strength, then all colored concrete shall be provided as High Early Strength. Switching from regular colored concrete to High Early Strength colored concrete or High Early Strength colored concrete to regular colored concrete will not be allowed.

If additional water is added to the colored concrete once a truck is on site, this concrete will be rejected.

If the engineer allows, minimal amounts of water may be applied to the surface of the colored concrete to complete the final surface finishing operations. If too much water is added to the surface of the colored concrete during final surface finishing operations, such that the colored concrete no longer conforms to the field test panel, the colored concrete may be rejected and removed at the direction of the engineer.

Cover and protect adjacent construction and concrete from discoloration and spillage during placement and curing of colored concrete. Remove and replace discolored concrete as the engineer directs.

Protect colored concrete from premature drying and excessive cold or hot temperatures. Apply evaporation retarders to concrete surfaces during initial finishing only if hot, dry, or windy conditions cause a moisture loss approaching 0.20 lb/sf/hr before and during initial finishing. Apply according to manufacturer's written instructions.

Protect the colored concrete from damage. Do not permit construction traffic or material storage on colored concrete sidewalk. Exclude other foot traffic from colored concrete sidewalk for at least 5 days after placement.

Remove and replace adjacent concrete that is discolored to the approval of the engineer.

D Measurement
The department will measure Colored Concrete Sidewalk, 4-Inch by the square foot acceptable completed in accordance to standard spec 602 and the plans.

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

ITEM NUMBER	DESCRIPTION	UNIT
SPV.0165.500	Colored Concrete Sidewalk 5-Inch	SF

Payment shall be in accordance to standard spec 602.

Payment also includes full compensation for excavation, forming, for providing placing and finishing colored concrete; for furnishing materials including concrete masonry, colored pigments, and necessary admixtures; for developing mix designs and providing sample and field panels; for protecting adjacent pavements and curb and gutter; and for furnishing all removal of the field test panel.

101. Architectural Surface Treatment, Item SPV.0165.700.

A Description
This special provision describes constructing a concrete masonry architectural surface treatment on the exposed concrete surfaces of cast in place structures as detailed in the plan, and as hereinafter provided.

B Materials
Furnish form liners that are made of highway strength urethane, or other department approved reusable or one time use form liner materials which do not compress more than 1/4-inch when poured at a rate of 10 vertical feet/hour.

Form liner at the pier columns, and the parapets shall have the cross-section dimensioning as detailed in the plans.

Use a release agent that is compatible with the form liner and coloring materials.

Wall ties shall have set “break-backs” at a minimum of ¾-inches from the finished concrete surface.

C Construction
C.1 Form Liner
Supply new form liner or reusable form liner with the patterns and dimensions for the limits as detailed in the plans. If reusable form liner is used, clean the form liner prior to each pour and ensure that it is free of any build-up. Visually inspect each liner for blemishes or tears, and repair if necessary per manufacturer’s recommendations.

Apply form release agent per manufacturer’s recommendations.

C.2 Form Liner Attachment
Attach form liner securely to forms in accordance to manufacturer's recommendations to maintain a continuous pattern, and coordinate wall ties with form liner and form manufacturer, e.g., diameter, size, and frequency where applicable.

C.3 Test Panel
The contractor shall prepare and deliver to the field office three 4-foot by 4-foot concrete test panels. Test panels shall be cast with the proposed banding pattern and form liner so the engineer will be able to evaluate the adequacy of the product and the forming methods to yield the desired results. Prepare one test panel to demonstrate the banding at the pier columns and abutments. Prepare one test panel to demonstrate the form liner pattern on the exterior face of the Modified Vertical Face Parapet Type A. Prepare one test panel to demonstrate the form liner pattern on the exterior face of the Modified Single Slope Parapet Type 42SS.

The engineer shall inspect condition of the test panel and its dimensional quality. All voids and irregularities shall be repaired using the same methods as on the final structures. The engineer will evaluate the test panel for definition and consistency. If the test panel is accepted the workmanship becomes the standard for the balance of the contractors work and incorporation into the final structures.

If either test panel is not accepted, the contractor shall prepare another test panel and repeat the process, using either a different product or different methods. This procedure shall be repeated until the test panel is accepted by the engineer.

C.4 Surface Finishing
Grind or fill pouring blemishes.

D Measurement
The department will measure Architectural Surface Treatment, by the square foot, 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.0165.700	Architectural Surface Treatment	SF

Payment is full compensation for creating and providing form liners, attaching form liners to forms; for forming and pouring test panels, delivery of test panels to site; producing the proposed architectural surface treatment; finishing and protecting the surface treatment; and for properly disposing of surplus material and test panels.

102. Shredded Hardwood Bark Mulch, Item SPV.0180.500.

A Description
This special provision describes furnishing and installing Shredded Hardwood Bark Mulch at the locations shown on the plans and in accordance to the requirements of standard spec 632, the plans, and as hereinafter provided.

B Materials
Provide Shredded Hardwood Bark Mulch, as shown on plan and in accordance to standard spec 632.2.6.

Shredded Hardwood Bark Mulch shall be finely shredded hardwood bark mulch and shall be the product of a mechanical chipper, hammermill, or tub grinder. The material shall be fibrous and uniformly dark brown in color, free of large wood chunks, and shall be substantially free of mold, dirt, sawdust, and foreign material. No portion of the material shall be in an advanced state of decomposition. The material shall not contain chipped up manufactured boards or chemically treated wood, including but not limited to wafer board, particle board, and chromated copper arsenate (CCA) or penta-treated wood. The material shall contain no bark of the black walnut tree. The material, when air dried, shall all pass a 4-inch screen and no more than 20 percent by mass of the material shall pass a 0.10-inch sieve. Unattached bark or greenleaf composition, either singly or combined, shall not exceed 20 percent each by mass. The maximum length of individual pieces shall not exceed 4 inches.

C Construction
Install mulch in accordance to standard spec 632.3.9 to a depth of 3 inches over entire area of bed.

Do not use any weed barrier fabric in bark mulch areas.

Place the hardwood bark mulch in such a manner as to not damage plants already in place.

D Measurement
The department will measure Shredded Hardwood Bark Mulch by the square yard, 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.0180.500	Shredded Hardwood Bark Mulch	SY

Payment is full compensation for furnishing and installing all materials.

103. General Requirements For Building Construction.

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 010000 – GENERAL REQUIREMENTS

PART 1 – GENERAL

(NOT USED)

PART 2 – PRODUCTS

(NOT USED)

PART 3 – EXECUTION

3.1 THE WISDOT REGION OFFICE PROJECT IS TO BE COMPLETED IN THREE STAGES.

1. Stage 1:

    a. Partition and door modifications to rooms 105 and 106.
    b. Installation of new suspended ceilings in the existing enclosed perimeter rooms in the existing north office area.
    c. Demolition and salvage of existing affected light fixtures.
    d. Extension and modification of the existing mechanical and fire protections systems for the new ceilings.
    e. Installation of the new light fixtures set in the new ceiling.
    f. Install wall and ceiling separation for door 145, separating existing office and garage. Provide temporary lockset.

2. Stage 2:

    a. Construction of new restrooms and new offices in existing south garage area.
    b. Exterior modifications to existing façade.

3. Stage 3:

    a. Demolition work for new partition layouts in existing north office area, including existing restrooms.
    b. Construction of new remaining work in existing north office area.

END OF SECTION 010000

SECTION 012500 – SUBSTITUTION PROCEDURES

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use CSI Form 13.1A or approved alternate.

2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.

f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

d. Requested substitution provides sustainable design characteristics that specified product provided.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION

(NOT USED)

END OF SECTION 012500

SECTION 013200 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Within 15 days after Date of Commencement, prepare and submit to OWNER's Representative for review preliminary Construction Progress Schedule.

B. No Work shall be performed on Sundays or legal holidays without written permission of OWNER's Representative. Emergency work may be performed without prior permission.

C. Night work may be established by CONTRACTOR as regular procedure with written permission of OWNER's Representative. Such permission may be revoked at any time by OWNER's Representative if CONTRACTOR fails to maintain adequate equipment and supervision for proper execution and control of Work at night.

1.2 FORM OF SCHEDULE

A. Prepare schedule in form of horizontal bar chart type.

1. Provide separate horizontal time bar for each trade, activity or operation.

2. Provide continuous vertical line to identify first working day of each week.

3. Scale and space to allow for notations and future revisions.

4. Schedule each activity in construction sequence.

B. Format of Listings: Chronological order of start of each activity or operation.

1.3 CONTENT OF SCHEDULE

A. Construction Progress Schedule:

1. Show complete sequence of construction by activity or operation.

2. Coordinate Construction Progress Schedule with Submittals.

3. Show dates for beginning and completion of each activity or operation during construction and installation dates for major items of equipment. Activities and operations shall include, but not be limited to following.

a. Material and equipment order, manufacturer, delivery, installation, and checkout, including allowance items.
b. Performance tests and supervisory services activity.
c. Piping, duct work, and wiring installation.
d. Construction of various facilities.
e. Concrete pour sequence.
f. Structural steel erection.
g. Precast concrete erection.
h. Backfilling, grading, seeding, sodding, landscaping, fence construction, and paving.
i. Electrical work activity.
j. Heating, ventilating, and air conditioning work activity.
k. Plumbing work activity.
l. Sewer installation.
m. Equipment installation.
n. Connection to existing sewers.
o. Water main installation.
p. Subcontractor's items of Work.
q. Alterations work.
r. Allowance for inclement weather.
s. Demolition.
t. System startup.
u. Final cleanup.
v. O&M data submittal.

4. Show projected percentage of completion for each item as of first day of each month.

1.4 SCHEDULE REVISIONS

A. Every 14 days, revise Construction Progress Schedule to reflect changes in progress of Work.

B. Indicate progress of each activity or operation at date of schedule revision.

C. Show changes occurring since previous revised submittal.

1. Major changes in scope.

2. Activities modified since previous submittal.

3. Revised projections of progress and completion.

4. Other identifiable changes.

D. Every 14 days, provide narrative report defining following.

1. Problem areas, anticipated delays, and impact on schedule.

2. Corrective action recommended and its effect.

E. Submit to OWNER's Representative.

1.5 DELAYS AND RECOVERY

A. If, at any time during Project, CONTRACTOR fails to complete activity by its latest scheduled completion date, CONTRACTOR shall, within 3 working days, submit to OWNER's Representative written statement as to how and when Work force will be reorganized to return Contract to current construction schedule.

B. When it becomes apparent from progress evaluation and updated schedule data that milestone completion or Contract completion dates will not be met, CONTRACTOR shall take some or all of following actions.

1. Increase construction staffing in such quantities and crafts as shall substantially eliminate backlog of Work.

2. Increase number of working hours per shift, shifts per Work day, Work days per week, or amount of construction equipment, or combination of foregoing sufficient to substantially eliminate backlog of Work.

3. Reschedule Work items to achieve concurrency of accomplishment.

C. Addition of equipment or construction forces, increasing working hours or other method, manner or procedure to return to current Construction Progress Schedule will not be considered justification for amending Contract Documents or treated as acceleration.

1.6 SUBMITTAL REQUIREMENTS

A. For initial submittal of Construction Progress Schedule and subsequent revisions thereof, submit 6 copies of schedule to OWNER's Representative. Failure to submit schedule on timely basis as previously noted shall be considered cause for withholding progress payments otherwise due under this Contract.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION 013200

SECTION 013300 – SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Section specifies procedural requirements for Work related (non administrative) submittals including Shop Drawings, substitutions, product data, samples, test data, operations and maintenance data, and other miscellaneous Work related submittals.

1. Submittals for record drawings are specified in Section 017839.

B. Administrative Submittals: Procedures concerning items such as listing of manufacturers, Suppliers, Subcontractors, Construction Progress Schedule, schedule of Shop Drawing submissions, bonds, payment applications, insurance certificates, and schedule of values are specified elsewhere.

C. Work Related Submittals:

1. Substitutes:

a. Includes material or equipment described in Section 012500 which CONTRACTOR requests OWNER to accept, after execution of the Contract.

2. Shop Drawings:

a. Includes technical data and drawings specially prepared for this Project, including fabrication and installation drawings, diagrams, data sheets, schedules, templates, patterns, reports, instructions, design mix formulas, measurements, and similar information not in standard printed form.
b. Standard catalog type information prepared without specific reference to Project is not considered as Shop Drawing.

3. Product Data:

a. Includes standard catalog type printed information on manufactured materials, equipment, and systems that has not been specially prepared for this Project, including manufacturer's product specifications, catalog cuts, standard wiring diagrams, printed performance curves, mill reports, and standard color charts.

4. Samples:

    a. Includes fabricated and manufactured physical examples of materials, products, and units of work, includes complete units, partial cuts of manufactured or fabricated work, swatches showing color, texture, and pattern, and units of work to be used for independent inspection and testing.
    b. Mock ups are special forms of samples too large or otherwise inconvenient for handling in manner specified for transmittal of sample submittals.

5. Test Results:

    a. Includes source and field quality inspection, test reports, actual performance curves, and certifications of results prepared specifically for equipment, material, and systems provided for this Project.
    b. Standard catalog charts or standard test results are considered Product Data.

6. Operations and Maintenance Data:

    a. Includes information and directions for operating and maintaining equipment provided and installed for this Project. May be standard for equipment or prepared specifically for this Project.

7. Miscellaneous Submittals:

    a. Work related submittals that do not fit in previous categories, includes schedules, photographs, guarantees, warranties, certifications, maintenance agreements, workmanship bonds, survey data and reports, physical work records, copies of industry standards, field measurement data, extra materials, keys, and similar information, devices, and materials applicable to Work.

1.2 SUBMITTAL PROCEDURES

A. Scheduling:

1. Provide submittal schedule in accordance to the General Conditions identifying the times for submitting, reviewing and processing each submittal for items of materials and equipment for which submittals are required by Specifications.

2. Adjust submittal schedule to reflect revisions to Construction Progress Schedule.

B. Coordination:

1. Coordinate preparation and processing of submittals with performance of Work. Coordinate each submittal with other submittals and related activities such as substitution requests, testing, purchasing, fabrication, delivery, and similar activities requiring sequential activity.

2. Coordinate submission of different units of interrelated Work so one submittal not be delayed by OWNER's need to review related submittal. OWNER may withhold action on submittal requiring coordination with other submittals until related submittals are forthcoming.

3. Prepare and transmit each submittal sufficiently in advance of scheduled performance of related Work and other applicable activities.

C. Submittal Preparation:

1. Stamp and sign each submittal certifying to review of submittal, verification of materials and equipment, field measurement, field construction criteria, and coordination of information within submittal with Contract Documents.

2. Transmittal Form: Provide transmittal identifying following.

   a. Date of submittal and dates of previous submittals.
   b. Project title and number.
   c. Submittal transmittal number.
   d. Contract identification.
   e. Names of:
      1) CONTRACTOR.
      2) Supplier.
      3) Manufacturer.
   f. If submittal is for substitute item of material or equipment, identify as "substitute" on transmittal.
   g. Identification of equipment and material with equipment identification numbers, motor numbers, and Specification section number.
   h. Deviations from Contract Documents.

D. Resubmittal Preparation:

1. Comply with requirements described in Submittal Preparation above, and in addition:

a. Identify on transmittal form submittal is resubmission.
b. Make corrections or changes in submittals required by REVIEWER's notations on returned submittal.
c. Respond to notations:
    1) On transmittal or separate page attached to CONTRACTOR'S resubmission transmittal, answer or acknowledge in writing notations or questions indicated on OWNER's Representative's transmittal form returning reviewed submission to CONTRACTOR.
    2) Identify each response by question or notation number established by REVIEWER.
    3) If CONTRACTOR does not respond to each notation or question, resubmission will be returned without action until CONTRACTOR provides written response to notations or questions.
d. CONTRACTOR initiated revisions or deviations.
    1) On transmittal form, identify deviations or revisions from previously reviewed submittal, other than those called for by REVIEWER.
    2) REVIEWER's responsibility for deviations or revisions is established in General Conditions.

1.3 SPECIFIC SUBMITTAL REQUIREMENTS

A. General:

1. Specific submittal requirements for individual units of Work are specified in applicable Specification section. Except as otherwise indicated in Specification sections, comply with requirements specified herein for each indicated type of submittal.

2. If OWNER has issued written interpretations and decisions to Contract Documents, CONTRACTOR shall include OWNER's response with applicable submittal.

B. Requests for Substitutes or "Or Equal":

1. Collect data for items to be submitted for review as substitute items into one submittal for each item of material or equipment in accordance to Section 012500 allowing time for REVIEWER to evaluate additional information required to be submitted.

2. If CONTRACTOR requests to substitute for material or equipment specified, but not identified in Specification as requiring submittals, CONTRACTOR shall indicate substitution submittal in Submittal Schedule.

C. Shop Drawings:

1. Submit newly prepared information, with graphic information at accurate scale and name of preparer indicated (firm name). Show dimensions and note which are based on field measurement, identify materials and equipment included in Work, and revisions on resubmittals. Indicate compliance with standards and notation of coordination requirements with other Work. Highlight, encircle or otherwise indicate deviations from Contract Documents or previous submittals.

2. If Drawings prepared by ARCHITECT are used in preparation of Shop Drawings, remove ARCHITECT'S identification.

3. Provide 8 in. by 3 in. blank space for CONTRACTOR and REVIEWER's stamps.

4. Submittals:

a. Submit full size photocopies for drawings larger than 11 in. by 17 in.

D. Product Data:

1. Preparation:

a. Collect required data into single submittal for each unit of Work or system. Where product data includes information on several similar materials or equipment, some of which are not required for use on Project or not included in submittal, mark copies to show which items are not applicable to Project.
b. Where product data must be specially prepared for equipment, materials or systems, because standard printed data is not suitable for use, submit data as Shop Drawing and not as product data.

2. Submittals:

a. Submit 6 copies.
b. Submittal is final when REVIEWER returns submittal marked "Approved," or "Approved as Noted."

3. Distribution:

a. Maintain one set of product data (for each submittal) at Project site, available for reference by OWNER's Representative and others.

E. Samples:

1. Preparation:

a. Provide samples physically identical with proposed materials or equipment to be incorporated into Work. Where variations in color, pattern or texture are inherent in material or product represented by sample, submit multiple units (not less than 3) showing approximate limits of variations.
b. Provide full set of option samples where selection by REVIEWER is required.
c. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards.
d. Submit samples for REVIEWER's visual review of general generic kind, color, pattern, texture, and for final check of coordination of these characteristics with other related elements of Work.
e. Mock ups and similar samples specified in Specification sections are recognized as special type of samples. Comply with samples submittal requirements to greatest extent possible.

2. Submittals:

a. At CONTRACTOR'S option, and depending upon nature of anticipated response from REVIEWER's, initial submittal of samples may be preliminary or final submittal.
b. Preliminary submittal, of single set of samples, required where Specification's indicate REVIEWER's selection of color, pattern, texture or similar characteristics from manufacturer's range of standard choices is necessary. Preliminary submittals will be reviewed and returned with REVIEWER's "Action" noted.
c. Final Submittals: Submit 3 sets of samples in final submittal, 1 set will be returned.

3. Distribution:

a. Maintain returned set of samples at Project site, in suitable condition and available for quality control comparisons throughout course of performing Work.

F. Test Results:

1. Preparation:

a. Identify each test by Specification section and type of test.

2. Submittals:

    a. Submit 3 copies.
    b. Submittal is to confirm that results of tests verify materials, products, and systems comply with Contract Documents.

3. Distribution:

    a. Unless otherwise required in Specification section test results shall be submitted to OWNER's Representative.

G. Operating and Maintenance (O&M) Data:

1. Organize operations and maintenance information into suitable sets of manageable size, and bind into individual binders properly identified and indexed (thumb tabbed). Include emergency instructions, spare parts listing, copies of warranties, wiring diagrams, recommended "turn around" cycles, inspection procedures, Shop Drawings, product data, and similar applicable information.

    a. Shop Drawings and other submittals included in O&M data shall be corrected to include, in same format and style as original submittal, review comments.

2. Binders: Heavy duty 2 in., 3 ring vinyl covered, include pocket folders for folded sheet information. Mark identification on front and spine of each binder.
3. Submit after equipment requiring O&M data has been returned "Approved" or "Approved as Noted."
4. Submit 2 copies.

H. Miscellaneous Submittals:

1. Guarantees, Warranties, Maintenance Agreements, and Workmanship Bonds:

    a. Refer to Specification sections for requirements. Submittal is considered final when submittal returned by REVIEWER, marked "Approved" or "Approved as Noted."
    b. In addition to copies desired for CONTRACTOR'S use, furnish 2 executed copies. Provide 2 additional copies where required for maintenance data.

2. Certifications:

    a. Refer to Specification sections for requirement on submittal of certifications. submit 6 copies. Certifications are submitted for review of conformance with specified requirements and information.

3. Closeout Submittals:

    a. Refer to Specification sections and Section 017839 for requirements on submittal of closeout information, materials, tools, and similar items.
        1) Materials and Tools: Spare parts, extra and overrun stock, maintenance tools and devices, keys, and similar physical units to be submitted.
        2) Operating and maintenance data.

I. General Distribution:

1. Unless required elsewhere, provide distribution of submittals to Subcontractors, suppliers, governing authorities, and others as necessary for proper performance of Work.
2. Provide copies of submittals bearing REVIEWER's action stamp to:

    a. Job site file.
    b. Record documents file.

1.4 ACTION ON SUBMITTALS

A. REVIEWER's Action:

1. General:

    a. Except for submittals for record and similar purposes, where action and return on submittals is required or requested, REVIEWER will review each submittal, mark with appropriate action, and return. Where submittal must be held for coordination, REVIEWER will so advise CONTRACTOR without delay.
    b. REVIEWER will stamp each submittal with uniform, self explanatory action stamp, appropriately marked with submittal action.

2. Notification of Insufficient Information:

   a. If information submitted is not sufficient to complete review of submittal, REVIEWER will send transmittal to CONTRACTOR notifying CONTRACTOR that additional information is required.
   b. Submittal will not be returned. Submittal will be placed in an "on hold" status until CONTRACTOR provides additional information.

3. Unsolicited Submittals: REVIEWER will return unsolicited submittals to CONTRACTOR without review.

B. Action Stamp:

1. Marking: Approved.

   a. Final Unrestricted Release: When submittals are marked as "Approved," Work covered by submittal may proceed provided it complies with Contract Documents. Acceptance of Work depends on that compliance.

2. Marking: Approved As Noted.

   a. Final But Restricted Release: When submittals are marked as "Approved With Noted Exceptions," Work covered by submittal may proceed provided it complies with REVIEWER's notations or corrections on submittal and with Contract Documents. Acceptance of Work depends on that compliance. Resubmittal not required.

3. Marking: Not Approved.

   a. Submittal Not Accepted: When submittals are marked as "Not Approved," do not proceed with Work covered by submittal. Work covered by submittal does not comply with Contract Documents.
   b. Prepare new submittal for different material or equipment supplier or different product line or material of same supplier complying with Contract Documents.

4. Marking: Revise and Resubmit.

   a. Returned for Resubmittal: When submittals are marked as "Revise and Resubmit," do not proceed with Work covered by submittal. Do not permit Work covered by submittals to be used at Project site or elsewhere where Work is in progress.

b. Revise submittal or prepare new submittal in accordance to REVIEWER's notations in accordance to resubmittal requirements of this section. Resubmit without delay. Repeat if required to obtain different action marking.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

(NOT USED)

END OF SECTION 013300

SECTION 016000 – PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

    a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.

2. Store materials in a manner that will not endanger Project structure.

3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.

2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.

3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

4. Where products are accompanied by the term "as selected," Architect will make selection.

5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Products:

   a. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.

4. Manufacturers:

   a. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

   1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

5. Samples, if requested.

PART 3 - EXECUTION

(NOT USED)

END OF SECTION 016000

SECTION 017329 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes procedural requirements for cutting and patching.

B. Related Sections include the following:
   1. Division 02 Section "Selective Demolition" for demolition of selected portions of the building.

   2. Divisions 03 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.

B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 QUALITY ASSURANCE

A. Requirements for Building Reuse:

   1. Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be removed; do not cut such existing construction beyond indicated limits.

   2. Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be removed; do not cut such existing construction beyond indicated limits.

   3. Maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to be removed; do not cut such existing construction beyond indicated limits.

B. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

1. Concrete floor and roof.

2. Concrete Beams.

3. Masonry walls.

C. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

D. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

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

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.

2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

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

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

3.3 PERFORMANCE

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

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

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

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

5. Proceed with patching after construction operations requiring cutting are complete.

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

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

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

a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

SECTION 017700 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.

B. Related Requirements:
   1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
   2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

1.2 ACTION SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by WisDOT. Label with manufacturer's name and model number where applicable.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain signature for receipt of submittals.

5. Submit test/adjust/balance records.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used prior to Substantial Completion.

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

6. Advise Owner of changeover in heat and other utilities.

7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.

8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

9. Complete final cleaning requirements, including touchup painting.

10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

2. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
3. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order,

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Submit list of incomplete items in the following format:

a. MS Excel electronic file. Architect will return annotated copy.
b. PDF electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

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

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

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

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
p. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

    a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 – OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Emergency manuals.
   3. Operation manuals for systems, subsystems, and equipment.
   4. Product maintenance manuals.
   5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
   2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:
   1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
      b. Enable inserted reviewer comments on draft submittals.
   2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.

2. Table of contents.

3. Manual contents.

C. Title Page: Include the following information:

1. Subject matter included in manual.

2. Name and address of Project.

3. Name and address of Owner.

4. Date of submittal.

5. Name and contact information for Contractor.

6. Name and contact information for Construction Manager.

7. Name and contact information for Architect.

8. Name and contact information for Commissioning Authority.

9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.

10. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.

2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.

4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.

2. Emergency instructions.

3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.

2. Flood.

3. Gas leak.

4. Water leak.

5. Power failure.

6. Water outage.

7. System, subsystem, or equipment failure.

8. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.

2. Shutdown instructions for each type of emergency.

3. Operating instructions for conditions outside normal operating limits.

4. Required sequences for electric or electronic systems.

5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.

2. Performance and design criteria if Contractor is delegated design responsibility.

3. Operating standards.

4. Operating procedures.

5. Operating logs.

6. Wiring diagrams.

7. Control diagrams.

8. Piped system diagrams.

9. Precautions against improper use.

10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:

1. Product name and model number.

2. Manufacturer's name.

3. Color, pattern, and texture.

4. Material and chemical composition.

5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.

2. Types of cleaning agents to be used and methods of cleaning.

3. List of cleaning agents and methods of cleaning detrimental to product.

4. Schedule for routine cleaning and maintenance.

5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.

3. Identification and nomenclature of parts and components.

4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.

2. Troubleshooting guide.

3. Precautions against improper maintenance.

4. Disassembly; component removal, repair, and replacement; and reassembly instructions.

5. Aligning, adjusting, and checking instructions.

6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

F. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 – PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Maintain at site one record copy of:

1. Drawings.
2. Project Manual.
3. Addenda.
4. Change orders and other modifications to Contract.
5. Field Orders, Work Change Directives, Written Amendments, or clarifications.
6. Returned Shop Drawings and other submittals.
7. Field test records.
8. Associated permits.
9. Certificates of inspection and approvals.

1.2 SUBMITTALS

A. At Substantial Completion:

1. Deliver 1 marked up set of record documents to OWNER.

B. Submit with transmittal letter containing following:

1. Date.
2. Project title and number.
3. CONTRACTOR’S name and address.
4. Title of record document.
5. Signature of CONTRACTOR or authorized representative.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store record documents and samples in CONTRACTOR'S field office apart from documents used for construction.

1. Provide files and racks for storage of documents.

2. Provide secure storage space for storage of samples.

B. Maintain record documents in clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

C. Make record documents and samples available for inspection by OWNER's Representative or OWNER.

D. Failure to properly maintain record documents may be reason to delay portion of progress payments until records comply with Contract Documents.

3.2 RECORD DOCUMENTS

A. General:

1. Maintain 1 complete set of Drawings and Project Manual, including Addenda, legibly annotated to show changes made during construction.

2. Label each document "PROJECT RECORD" in neat, large printed letters.

3. Record information concurrently with construction progress:

   a. Do not conceal Work until information is recorded.
   b. Record changes made by Change Order, Construction Change Directive or order for minor change in Work and identify document number.

4. Give particular attention to concealed equipment and materials that would be difficult to measure and record at later date.

B. Drawings:

1. Graphically depict changes by modifying or adding to plans, details, sections, elevations, or schedules.

2. Make changes on each sheet affected by changes.

3. Dimensions:

a. Depths of various elements of foundation in relation to finish first floor datum.
b. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

4. Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.

5. Details not on original Drawings.

6. Location and identification of exposed interior piping, including those shown schematically on Drawings.

7. Size of equipment and location including connections.

8. Electrical and Instrumentation:

a. Horizontal and vertical locations and size of underground cable, conduit, and duct runs dimensioned from established building lines.
b. Plan location and size of interior concealed and exposed feeders.
c. Size and location of access panels.
d. Variations from original Drawings.

C. Specifications:

1. Mark Specification sections to show substantial variations in actual Work performed in comparison with text of Specifications and modifications.

2. Include variations in products delivered to site and from manufacturer's installation instructions and recommendations.

3. Give particular attention to substitutions and selection of options and similar information.

4. Note related record drawing information and Product Data.

END OF SECTION 017839

SECTION 017900 – DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.

2. Training in operation and maintenance of systems, subsystems, and equipment.

1.2 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Operations manuals.
    c. Maintenance manuals.
    d. Project record documents.
    e. Identification systems.
    f. Warranties and bonds.
    g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

    a. Startup procedures.
    b. Equipment or system break-in procedures.
    c. Routine and normal operating instructions.
    d. Regulation and control procedures.
    e. Control sequences.
    f. Safety procedures.
    g. Instructions on stopping.
    h. Normal shutdown instructions.
    i Operating procedures for emergencies.

j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.

2. Owner will furnish an instructor to describe Owner's operational philosophy.

3. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

C. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

END OF SECTION 017900

DIVISION 2 – SITE CONSTRUCTION

SECTION 024119 – SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.

2. Demolition and removal of selected site elements.

3. Salvage of existing items to be reused or recycled.

1.2 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.3 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

1.4 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

1. Before selective demolition, Owner will remove the following items:

    a. Existing phones and computers in place in areas of work.
    b. Existing office furniture in place in areas of work.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.5 WARRANTY

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

D. UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

E. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."

F. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.

2. Arrange to shut off indicated utilities with utility companies.

3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.

    a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.2 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

3.3 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.

4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

5. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until delivery to Owner.

4. Transport items to Owner's storage area designated by Owner.

5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.

2. Pack or crate items after cleaning and repairing. Identify contents of containers.

3. Protect items from damage during transport and storage.

4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.4 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site.

1. Do not allow demolished materials to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

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

3.5 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119

DIVISION 3 – CONCRETE

SECTION 033000 – CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Material certificates.

C. Material test reports.

D. Floor surface flatness and levelness measurements.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete,"

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

1. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated after fabrication and bending.

2. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M, epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

D. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from galvanized-steel wire into flat sheets.

E. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, steel.

F. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II.

B. Normal-Weight Aggregates: ASTM C 33, graded.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.

2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94/C 94M.

2.4 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2. Retarding Admixture: ASTM C 494/C 494M, Type B.

3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.

5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.

6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.5 VAPOR RETARDERS

A. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick.

2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

2.7 CONCRETE MIXTURES

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use admixture in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

C. Furnish in accordance to table. Cement contents listed are minimum values and shall be increased as required to attain other specified characteristics.

D. Air contents listed are for concrete requiring air entrainment as specified herein. Contents listed shall be maintained after addition of admixtures.

E. Slumps listed are maximum, except when high range water reducer is used. Maximum slump when high range water reducer is used, 10 inches.

F. Chloride ion content shall not exceed values listed in ACI 318, Table 4.3.1.

G. Provide Class C concrete (see table below) for trench floor repairs, exterior equipment pad and pole bases.

Class	**Compressive Strength (psi)**	**Coarse Aggregate (maximum size)**	**Minimum Cement Factor (bags/cu yd)**	**Air Content (%)**	**Slump (inches)**	**Water/Cement Ratio (maximum)**
C	4,000	3/4 inch	6.0	6$\pm$1-1/2	3 $\pm$1	0.45
Note: Interior concrete floor with trowel-finished surface, limit air content to 3% max.						

2.8 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

3.6 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.

C. Cold-Weather Placement: Comply with ACI 306.1.

D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

3.8 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer,

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.9 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

3.10 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

END OF SECTION 033000

DIVISION 6 – WOODS AND PLASTICS

SECTION 066400 – PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic sheet paneling.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For plastic paneling.

1.3 QUALITY ASSURANCE

A. Testing Agency: Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Crane Composites, Inc.
    b. Glasteel.
    c. Marlite.
    d. Or approved equal

3. Low-Emitting Materials: Paneling shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

4. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings of applicable testing agency.

   a. Flame-Spread Index: 25 or less.
   b. Smoke-Developed Index: 450 or less.

5. Nominal Thickness: Not less than 0.09 inch (2.3 mm).

6. Surface Finish: Molded pebble texture.

7. Color: White.

2.2 ACCESSORIES

A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, and caps as needed to conceal edges.

   1. Color: White.

B. Adhesive: As recommended by plastic paneling manufacturer and that complies with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.

B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

C. Lay out paneling before installing. Locate panel joints where indicated.

3.2 INSTALLATION

A. Install plastic paneling according to manufacturer's written instructions.

B. Install panels in a full spread of adhesive.

C. Install trim accessories with adhesive.

D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.

E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.

F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 066400

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

SECTION 074213 – FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exposed-fastener, lap-seam metal wall panels.

2. Concealed-fastener, lap-seam metal wall panels.

3. Metal liner panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.

C. Samples: For each type of metal panel indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Warranties: Samples of special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing metal panels warranted by manufacturer to be the same as factory-formed products. Maintain UL certification of portable roll-forming equipment for duration of work.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.

2. Other Design Loads: As indicated on Drawings.

3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).

D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

F. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 EXPOSED-FASTENER, LAP-SEAM METAL WALL PANELS

A. General: Provide factory-formed metal panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.

B. Rib-Profile, Exposed-Fastener Metal Wall Panels: Match existing profile.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

a. CENTRIA Architectural Systems.
b. Fabral.
c. MBCI; a division of NCI Building Systems, L.P.
d. McElroy Metal, Inc.
e. Metal Sales Manufacturing Corporation.
f. Morin; a Kingspan Group company.
g. Petersen Aluminum Corporation.
h. Or approved equal.

3. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

a. Nominal Thickness: Match existing.
b. Exterior Finish: Two-coat fluoropolymer or match existing.
c. Color: Match existing.

4. Major-Rib Spacing: Match existing.

5. Panel Coverage: Match existing.

6. Panel Height: Match existing.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.

2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-(25-mm-) thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing; 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

2. Joint Sealant: ASTM C 920; as recommended in writing by metal panel manufacturer.

3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.

C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

D. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

E. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

2.5 FINISHES

A. Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 621 AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.

2. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

3. Concealed Finish: White or light-colored acrylic or polyester backer finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.2 METAL PANEL INSTALLATION

A. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.

2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.

3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.

4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

5. Flash and seal panels with weather closures at perimeter of all openings.

B. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.

2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.

3. At panel splices, nest panels with minimum 6-inch (152-mm) end lap, sealed with sealant and fastened together by interlocking clamping plates.

C. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

D. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

3.3 CLEANING

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

END OF SECTION 074213

DIVISION 8 – DOORS AND WINDOWS

SECTION 081113 – HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes hollow-metal work.

1.2 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Amweld International, LLC.

2. Apex Industries, Inc.

3. Ceco Door Products; an Assa Abloy Group company.

4. Curries Company; an Assa Abloy Group company.

5. Custom Metal Products.

6. Daybar.

7. Door Components, Inc.

8. LaForce, Inc.

9. National Custom Hollow Metal.

10. North American Door Corp.

11. Premier Products, Inc.

12. Republic Doors and Frames.

13. Security Metal Products Corp.

14. Steelcraft; an Ingersoll-Rand company.

15. Or approved equal.

2.2 INTERIOR DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level B according to SDI A250.4.

2. Doors:

   a. Type: As indicated in the Door and Frame Schedule.
   b. Thickness: 1-3/4 inches (44.5 mm).
   c. Face: Uncoated cold-rolled steel sheet, minimum thickness of 0.042 inch (1.0 mm).
   d. Core: Polystyrene, Polyurethane, Polyisocyanurate.

3. Frames:

   a. Materials: Uncoated, steel sheet, minimum thickness of 0.053 inch (1.3 mm).
   b. Construction: Face welded.

4. Exposed Finish: Prime.

2.3 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.4 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.

2.5 FABRICATION

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.

3. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
   1) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.

4. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.

   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.6 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: SDI A250.10.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

a. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
b. Install frames with removable stops located on secure side of opening.
c. Install door silencers in frames before grouting.
d. Remove temporary braces necessary for installation only after frames have been properly set and secured.
e. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.

4. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).

c. At Bottom of Door: 3/4 inch (19.1 mm) plus or minus 1/32 inch (0.8 mm).
d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

C. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113

SECTION 081416 – FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.

2. Factory finishing flush wood doors.

3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of door.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.

2. Dimensions and locations of mortises and holes for hardware.

3. Dimensions and locations of cutouts.

4. Undercuts.

5. Requirements for veneer matching.

6. Doors to be factory finished and finish requirements.

7. Fire-protection ratings for fire-rated doors.

C. Samples: For factory-finished doors.

1.3 INFORMATIONAL SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Algoma Hardwoods, Inc.
2. Ampco.
3. Chappell Door Co.
4. Eggers Industries.
5. General Veneer Manufacturing Co.
6. Graham Wood Doors; an Assa Abloy Group company.
7. Haley Brothers, Inc.
8. Ipik Door Company.
9. Lambton Doors.
10. Marlite.
11. Marshfield Door Systems, Inc.
12. Mohawk Doors; a Masonite company.
13. Oshkosh Door Company.
14. Poncraft Door Company.
15. Vancouver Door Company.
16. VT Industries, Inc.
17. Or approved equal.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.

B. WDMA I.S.1-A Performance Grade:

1. Heavy Duty unless otherwise indicated.

2. Standard Duty: Closets (not including janitor's closets).

C. Structural-Composite-Lumber-Core Doors:

1. Structural Composite Lumber: WDMA I.S.10.

a. Screw Withdrawal, Face: 700 lbf (3100 N).
b. Screw Withdrawal, Edge: 400 lbf (1780 N).

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade AA faces.

2. Species: Red oak.

3. Cut: Plain sliced (flat sliced).

4. Match between Veneer Leaves: Book match.

5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

6. Core: Either glued wood stave or structural composite lumber.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

C. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings of material and profile indicated.

2. Glazing: Factory install glazing in doors indicated to be factory finished.

3. Louvers: Factory install louvers in prepared openings.

2.5 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 099123" Interior Painting."

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors that are indicated to receive transparent finish.

C. Use only paints and coatings that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Transparent Finish:

1. Grade: Premium.

2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 11, catalyzed polyurethane.

3. Staining: Match existing doors of facility.

4. Effect: Open-grain finish.

5. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors according to NFPA 80.

2. Install smoke- and draft-control doors according to NFPA 105.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 081416

SECTION 085113 – ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes aluminum windows for exterior locations.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches (50 by 100 mm) in size.

D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranties.

1.4 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1.5 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. Window: 10 years from date of Substantial Completion.
b. Glazing Units: 10 years from date of Substantial Completion.
c. Aluminum Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

1. EFCO Corporation; a Pella company.
2. Graham Architectural Products Corp.
3. Kawneer North America; an Alcoa company.
4. Peerless Products Inc.
5. Thermal Windows, Inc.
6. TRACO.
7. Wausau Window and Wall Systems.
8. Winco.
9. YKK AP America Inc.
10. Or approved equal.

2.2 WINDOW PERFORMANCE REQUIREMENTS

A. Product Standard: AAMA/WDMA/CSA 101/I.S.2/A440.

1. Minimum Performance Class: CW.

B. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.35 Btu/sq. ft. x h x deg F (2.0 W/sq. m x K).

C. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.30.

2.3 ALUMINUM WINDOWS

A. Frames and Sashes: Thermally broken aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

B. Glass: Clear annealed glass, ASTM C 1036, Type 1, Class 1, q3.

1. Kind: Fully tempered where indicated on Drawings.

C. Insulating-Glass Units: ASTM E 2190.

1. Glass: ASTM C 1036, Type 1, Class 1, q3.

a. Tint: Gray.
b. Kind: Fully tempered where indicated on Drawings.

2. Lites: Two.

3. Filling: Fill space between glass lites with argon.

4. Low-E Coating on second surface.

D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

E. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

F. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.

1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 ACCESSORIES

A. Subsills: Thermally broken extruded-aluminum subsills in configurations indicated on Drawings.

B. Interior Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

C. Panning Trim: Extruded-aluminum profiles in sizes and configurations indicated on Drawings.

D. Receptor System: Two-piece, snap-together, thermally broken, extruded-aluminum receptor system that anchors windows in place.

2.5 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

F. Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.

G. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 ALUMINUM FINISHES

A. Anodic Finish: Class I complying with AAMA 611.

1. Color: Match existing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.

B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.

C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.

D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

E. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

F. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

G. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 085113

SECTION 087100 – DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:

a. Swinging doors.

2. Cylinders for door hardware specified in other Sections.

B. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.

1. Lock cylinders.

2. Permanent lock cores to be installed by Owner.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed product and for each color and texture specified.

C. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
b. Content: Include the following information:
1) Identification number, location, hand, fire rating, size, and material of each door and frame.
2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.

1.3 QUALITY ASSURANCE

A. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

B. Accessibility Requirements: For door hardware on doors in an accessible route, comply with ICC/ANSI A117.1

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).

2. Comply with the following maximum opening-force requirements:

a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.

3. Bevel raised thresholds with a slope of not more than 1:2.

4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

B. Deliver keys and permanent cores to Owner.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.

a. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.2 HINGES

A. Hinges: BHMA A156.1.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Hager Companies.
b. IVES Hardware; an Ingersoll-Rand company.
c. Lawrence Hardware Inc.
d. McKinney Products Company; an ASSA ABLOY Group company.
e. Stanley Commercial Hardware; Div. of The Stanley Works.
f. Or approved equal.

2.3 SELF-CLOSING HINGES AND PIVOTS

A. Self-Closing Hinges and Pivots: BHMA A156.17.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Hager Companies.
b. Lawrence Hardware Inc.
c. McKinney Products Company; an ASSA ABLOY Group company.
d. Stanley Commercial Hardware; Div. of The Stanley Works.

2.4 MECHANICAL LOCKS AND LATCHES

A. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

2. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.

3. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

B. Locks: Match existing grade, type and finish.

1. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
b. Best Access Systems; Div. of Stanley Security Solutions, Inc.

c. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
d. Falcon Lock; an Ingersoll-Rand company.
e. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
f. Schlage Commercial Lock Division; an Ingersoll-Rand company.
g. Or approved equal.

2.5 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Manufacturer: Same manufacturer as for locking devices.

2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

3. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
c. Falcon Lock; an Ingersoll-Rand company.
d. Medeco Security Locks, Inc.; an ASSA ABLOY Group company.
e. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
f. Schlage Commercial Lock Division; an Ingersoll-Rand company.
g. Or approved equal.

B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.6 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.

1. Review keying system with OWNER and provide type required (master, grand master or great grand master), either new or integrated with existing keying system.

B. Keys:

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE."

2. Quantity: In addition to one extra key blank for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.
c. Grand Master Keys: Five.
d. Great-Grand Master Keys: Five.

2.7 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
b. DORMA Architectural Hardware; Member of The DORMA Group North America.
c. Dor-O-Matic; an Ingersoll-Rand company.
d. LCN Closers; an Ingersoll-Rand company.
e. Norton Door Controls; an ASSA ABLOY Group company.
f. Rixson Specialty Door Controls; an ASSA ABLOY Group company.

g. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
h. Or approved equal.

2.8 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on schedule or comparable product by one of the following:

a. Architectural Builders Hardware Mfg., Inc.
b. Don-Jo Mfg., Inc.
c. Door Controls International, Inc .
d. Hager Companies.
e. Hiawatha, Inc.
f. IVES Hardware; an Ingersoll-Rand company.
g. Rockwood Manufacturing Company.
h. Stanley Commercial Hardware; Div. of The Stanley Works.
i. Trimco.
j. Or approved equal.

2.9 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

2.10 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

C. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

D. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as directed by Owner.

2. Furnish permanent cores to Owner for installation.

F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

G. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.2 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

3.3 DOOR HARDWARE SCHEDULE

A. Hardware Set No. 1:

1-1/2 pr. Hinges
1 Lockset, privacy function
1 Closer
1 Wall Stop
1 set Door silencers

B. Hardware Set No. 2:

1-1/2 pr. Hinges
1 Lockset
1 Electrified Strike
1 Closer
1 Wall Stop
1 set Door silencers

C. Hardware Set No. 3:

1-1/2 pr. Hinges
1 Lockset, office function
1 1 Wall Stop
1 set Door silencers

D. Hardware Set No. 4:

1-1/2 pr. Hinges
1 Lockset, storeroom function
1 1 Wall Stop
1 set Door silencers

E. Hardware Set No. 5:

1-1/2 pr. Hinges
1 Lockset, storeroom function
1 Closer
1 Wall Stop
1 set Door silencers

F. Hardware Set No. 6:

1-1/2 pr. Hinges
1 Lockset, Classroom function
1 Closer
1 Wall Stop
1 set Door silencers

G. Hardware Set No. 7:

2 Recessed Door Pulls
1 Sliding track

H. Hardware Set No. 8:

1-1/2 pr. Hinges
1 Push Plate
1 Pull Plate
1 Closer
1 Wall Stop
1 set Door silencers

I. Hardware Set No. 9:

1-1/2 pr. Hinges
1 Lockset, Passage function
1 Wall Stop
1 set Door silencers

END OF SECTION 087100

DIVISION 9 – FINISHES

SECTION 092216 – NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior gypsum board assemblies.

2. Suspension systems for interior gypsum ceilings and soffits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: Provide materials and construction identical to those tested according to ASTM E 119.

B. STC-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413.

2.2 FRAMING SYSTEMS

A. Steel Studs and Runners: ASTM C 645

1. Minimum Base-Metal Thickness: As indicated on Drawings.

2. Depth: As indicated on Drawings.

B. Slip-Type Head Joints: Where indicated, provide one of the following in thickness not less than indicated for studs and in width to accommodate depth of studs:

1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch-(51-mm-) deep flanges, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.

2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges and fastened to studs, and outer runner sized to friction fit inside runner.

3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes due to deflection of structure above.

a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
2) MBA Building Supplies; [FlatSteel Deflection Track] [Slotted Deflecto Track].
3) Steel Network Inc. (The); [VertiClip SLD] [VertiTrack VTD] Series.
4) Superior Metal Trim; Superior Flex Track System (SFT).
5) Telling Industries; [Vertical Slip Track] [Vertical Slip Track II].
6) Or approved equal.

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm)

2.3 AUXILIARY MATERIALS

A. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.

2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.

E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 092900 – GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Georgia-Pacific Gypsum LLC.

2. National Gypsum Company.

3. USG Corporation.

4. Or approved equal.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Thickness: 5/8 inch (15.9 mm).

2. Long Edges: Tapered

2.2 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.

2.3 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

E. Prefill open joints, rounded or beveled edges, and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

   1. Level 3

H. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

I. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 092900

SECTION 093000 – TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ceramic tile.

2. Crack isolation membrane.

3. Metal edge strips.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples:

1. Each type and composition of tile and for each color and finish required.

2. Assembled samples, with grouted joints, for each type and composition of tile and for each color and finish required.

3. Stone thresholds in 6-inch (150-mm) lengths.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. Tile Type CT-1: Porcelain tile.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide Crossville Tile, Color Blox, Tree House A1114 or comparable product by one of the following:

a. American Olean; Division of Dal-Tile International Inc.
b. Crossville, Inc.
c. Daltile; Division of Dal-Tile International Inc.

d. GranitiFiandre; c/o Trans Ceramica, Ltd.
e. Interceramic.
f. Grupo Porcelanite.
g. Portobello America, Inc.
h. Or approved equal.

3. Composition: Porcelain.

4. Face Size: 12 inch by 18 inch.

5. Thickness: 3/8 inch (9.5 mm).

6. Tile Color and Pattern: Match Architect's sample, install in staggered pattern.

7. Grout Color: As selected by Architect from manufacturer's full range.

C. Tile Type CT-1: Glazed ceramic wall tile.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. American Marazzi Tile, Inc.
b. American Olean; Division of Dal-Tile International Inc.
c. Daltile; Division of Dal-Tile International Inc.
d. Florida Tile Industries, Inc.
e. United States Ceramic Tile Company.
f. Or approved equal.

3. Module Size: 6 by 4-1/4 inches (152 by 108 mm).

4. Thickness: 5/16 inch (8 mm).

5. Face: Pattern of design indicated, with manufacturer's standard edges.
6. Finish: Bright, clear glaze.

7. Tile Color and Pattern: As selected by Architect from manufacturer's full range.

8. Grout Color: As selected by Architect from manufacturer's full range.

9. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

    a. Base: Straight, module size 6 by 3-3/4 inches (152 by 95 mm).
    b. Wainscot Cap: Bullnose cap, module size 6 by 2 inches (152 by 51 mm).
    c. External Corners for Thin-Set Mortar Installations: Bullnose shape, same size as adjoining flat tile.
    d. Internal Corners: Field-butted square corners.

2.2 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.

B. Metal Thresholds:

1. Description: brushed chrome finish.

2.3 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

    a. Custom Building Products; Wonderboard.
    b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
    c. USG Corporation; DUROCK Cement Board.
    d. Or approved equal

3. Thickness: 5/8 inch (15.9 mm).

2.4 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product, that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated.

B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Bonsal American, an Oldcastle company; B 6000 Waterproof Membrane with Glass Fabric.
b. Bostik, Inc.; Hydroment Blacktop 90210.
c. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
d. Laticrete International, Inc.; Laticrete Blue 92 Anti-Fracture Membrane.
e. MAPEI Corporation; Mapelastic L (PRP M19).
f. Mer-Kote Products, Inc.; Hydro-Guard 2000.
g. Summitville Tiles, Inc.; S-9000.
h. Or approved equal.

C. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Bostik, Inc.; Durabond D-222 Duraguard Membrane.
b. Custom Building Products; FractureFree Crack Prevention Membrane.
c. Jamo Inc.; Waterproof.
d. Mer-Kote Products, Inc.; Fracture-Guard 5000.
e. Southern Grouts & Mortars, Inc.; Southcrete 1100 Crack Suppression and Waterproofing.
f. TEC, a subsidiary of H. B. Fuller Company; HydraFlex - Waterproofing Crack Isolation Membrane.
g. Or approved equal.

D. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.

1. Products: Subject to compliance with requirements, provide one of the following:

a. C-Cure; UltraCure 971.
b. MAPEI Corporation; Mapelastic (PRP 315).
c. TEC, a subsidiary of H. B. Fuller Company; Triple Flex Waterproofing, Crack Isolation Membrane & Mortar.
d. Or approved equal.

2.5 SETTING MATERIALS

A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Custom Building Products.
b. Laticrete International, Inc.
c. MAPEI Corporation.
d. Summitville Tiles, Inc.
e. TEC; a subsidiary of H. B. Fuller Company.
f. Or approved equal.

2. For wall applications, provide nonsagging mortar.

C. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Custom Building Products.
b. Laticrete International, Inc.
c. MAPEI Corporation.
d. Summitville Tiles, Inc.
e. TEC; a subsidiary of H. B. Fuller Company.
f. Or approved equal.

2. Prepackaged, dry-mortar mix to which only water must be added.

3. Prepackaged, dry-mortar mix combined with liquid-latex additive.

4. For wall applications, provide nonsagging mortar.

2.6 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10.

B. Standard Cement Grout: ANSI A118.6.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Custom Building Products.
b. Laticrete International, Inc.
c. MAPEI Corporation.
d. Summitville Tiles, Inc.
e. TEC; a subsidiary of H. B. Fuller Company.
f. Or approved equal.

C. Polymer-Modified Tile Grout: ANSI A118.7.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Custom Building Products.
b. Laticrete International, Inc.
c. MAPEI Corporation.
d. Summitville Tiles, Inc.
e. TEC; a subsidiary of H. B. Fuller Company.
f. Or approved equal.

2. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.

3. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.

2.7 ELASTOMERIC SEALANTS

A. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. DAP Inc.; 100 percent Silicone Kitchen and Bath Sealant.
    b. Dow Corning Corporation; Dow Corning 786.
    c. GE Silicones, a division of GE Specialty Materials; Sanitary 1700.
    d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
    e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
    f. Tremco Incorporated; Tremsil 600 White.
    g. Or approved equal.

2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, stainless steel, ASTM A 666, 300 Series exposed-edge material.

C. Grout Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Custom Building Products; Grout Sealer.
    b. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
    c. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
    d. TEC, a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.
    e. Or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.

C. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:

    a. Tile floors in wet areas.
    b. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Porcelain Floor Tile: 1/4 inch (6.35 mm).

2. Glazed Wall Tile: 1/16 inch (1.6 mm).

G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

I. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).

J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

K. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

L. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

M. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

N. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

3.4 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Tile Installation F113: Thin-set mortar; TCA F113.

    a. Tile Type: Porcelain Tile
    b. Thin-Set Mortar: Latex- portland cement mortar.
    c. Grout: Polymer-modified sanded grout.

B. Interior Wall Installations, Metal Studs or Furring:

1. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment; TCA W244.

    a. Tile Type: Glazed ceramic tile.
    b. Thin-Set Mortar: Dry-set or Latex- portland cement mortar.
    c. Grout: Standard unsanded cement grout.

END OF SECTION 093000

SECTION 095123 – ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes acoustical tiles and concealed suspension systems for ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Evaluation reports.

C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.

2. Smoke-Developed Index: 50 or less.

1.6 ACOUSTICAL TILE CEILINGS, GENERAL

A. Metal Suspension System Standard: Comply with ASTM C 635.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Cirrus Tegular or comparable product by one of the following:

1. Armstrong World Industries, Inc.

2. CertainTeed Corp.

3. USG Interiors, Inc.; Subsidiary of USG Corporation.

C. Classification: Mineral fiber, fine surface texture.

D. Color: White.

E. LR: .90

F. NRC: .70, Type E-400 mounting according to ASTM E 795. F.

G. CAC: .35

H. Edge/Joint Detail: Beveled Tegular for interface with Suprafine XL 9/16" Exposed Tee.

I. Thickness: 3/4 inch (19 mm).

J. Modular Size: 24 by 24 inches.

2.2 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong Suprafine XL 9/16" Exposed Tee or comparable product by one of the following:

1. Armstrong World Industries, Inc.

2. USG Interiors, Inc.; Subsidiary of USG Corporation.

3. Celotex

4. Or approved equal.

C. Attachment Devices: Size for five times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.

D. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three design load, but not less than 12 gauge.

E. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install acoustical tile ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

C. Arrange directionally patterned acoustical tiles as indicated on reflected ceiling plans.

END OF SECTION 095123

SECTION 096519 – RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Vinyl composition floor tile.

2. Vinyl plank floor tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 VINYL COMPOSITION FLOOR TILE (VCT-1)

A. Products: Subject to compliance with requirements, provide one of the following:

1. Armstrong World Industries, Inc;

2. Tarkett, Inc;

3. Mannington Mills, Inc;

B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.

C. Wearing Surface: Smooth.

D. Thickness: 0.125 inch (3.2 mm).

E. Size: 12 by 12 inches (305 by 305 mm).

F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.3 VINYL PLANK FLOOR TILE (VT-1)

A. Products: Subject to compliance with requirements, provide one of the following:

1. Johnsonite, I.D. Premier Planks, Color Wedge IDPP-3017 (Basis of Design);

2. LSI Floors

3. Gerfloor

4. Or approved equal.

B. Thickness: 0.98 inch.

C. Size: 37 by 6.16 inches.

D. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

1. Adhesives shall comply with the following limits for VOC content:

a. Vinyl Composition Tile Adhesives: 50 g/L or less.
b. Rubber Floor Adhesives: 60 g/L or less.

2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION

A. Comply with manufacturer's written instructions for installing floor tile.

B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis.

C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain running in one direction.

D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

F. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

B. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

1. Apply one coat.

END OF SECTION 096519

SECTION 096813 – TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes modular carpet tile.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.6 FIELD CONDITIONS

A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

1.7 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.

2. Failures include, but are not limited to, more than 10 percent edge raveling, snags, runs, loss of face fiber, and delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE <CT-1>

A. Basis-of-Design Product: Subject to compliance with requirements, provide Patcraft modular carpet or comparable product by one of the following:

1. Patcraft modular carpet.

2. Interface

3. Shaw Contract Group

4. Or approved equal.

B. Color: Coco Pazza

C. Pattern: Modern Geometry Brights

D. Fiber Content: nylon.

E. Fiber Type: Eco solution Q Nylon

F. Pile Characteristic: Multi Level-loop pile.

G. Yarn Weight: 26

H. Density: 6500

I. Pile Thickness: 0.144.

J. Stitches: 11

K. Gage: 1/12

L. Primary Backing/Backcoating: Manufacturer's standard composite materials.

M. Secondary Backing: Manufacturer's standard material.

N. Backing System: Non-woven synthetic

O. Size: 24 by 24 inches (610 by 610 mm).

P. Applied Soil-Resistance Treatment: Manufacturer's standard material.

Q. Antimicrobial Treatment: Manufacturer's standard material.

R. Performance Characteristics: As follows:

1. Appearance Retention Rating: Heavy traffic, 3.0 minimum according to ASTM D 7330.

2. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D 2646.

3. Dimensional Tolerance: Within 1/32 inch (0.8 mm) of specified size dimensions, as determined by physical measurement.

4. Dimensional Stability: 0.2 percent or less according to ISO 2551 (Aachen Test).

5. Resistance to Insects: Comply with AATCC 24.

6. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC 165.

7. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) according to AATCC 16, Option E.

8. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria, not less than 1-mm halo of inhibition for gram-negative bacteria, and no fungal growth, according to AATCC 174.

9. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.

B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

D. Preparation: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.

E. Installation: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.

F. Installation Method: Partial glue down; install periodic tiles with releasable, pressure-sensitive adhesive.

G. Maintain dye lot integrity. Do not mix dye lots in same area.

H. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

I. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

J. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

K. Install tile parallel to walls and borders, quarter turn pattern.

L. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.

2. Remove yarns that protrude from carpet tile surface.

3. Vacuum carpet tile using commercial machine with face-beater element.

M. Protect installed carpet tile to comply with CRI 104, Section 16, "Protecting Indoor Installations."

END OF SECTION 096813

SECTION 098436 – SOUND-ABSORBING CEILING UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes shop-fabricated, fabric-wrapped, sound-absorbing panels tested for acoustical performance.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For sound-absorbing ceiling units. Include mounting devices and details.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

1. Acoustical Panel Systems (APS, Inc.).
2. AVL Systems, Inc.
3. Benton Brothers Solutions, Inc.
4. Essi Acoustical Products.
5. Golterman & Sabo.
6. Kinetics Noise Control, Inc.
7. Lamvin, Inc.
8. MBI Products Company, Inc.
9. Perdue Acoustics.
10. Proudfoot Company, Inc. (The).
11. Sound Concepts Canada, Inc.
12. Sound Management Group LLC.
13. Working Walls, Inc.
14. Or approved equal.

2.2 PERFORMANCE REQUIREMENTS

A. General Requirements for Sound-Absorbing Ceiling Units: Provide sound-absorbing panels that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. Fire-Test-Response Characteristics: Provide sound-absorbing ceiling units meeting the following requirements as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 25 or less.
    b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 or NFPA 286.

2.3 SOUND-ABSORBING CEILING UNITS

A. Sound-Absorbing Ceiling Panel: Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back edge border of core.

1. Basis-of-Design Product: Armstrong Soundscapes Shapes 5445 Trapezoid

2. Mounting: Back mounted with manufacturer's standard suspension system with stiffening, back-support angles, secured to substrate.

3. Core: Glass-fiber board.

4. Edge Construction: Manufacturer's standard chemically hardened core with no frame.

5. Edge Profile: Square.

6. Corner Detail in Elevation: Square with continuous edge profile indicated.

7. Acoustical Performance: Sound absorption SAA of not less than 1.00 according to ASTM C 423 for Type A Type J mounting according to ASTM E 795.

8. Nominal Core Thickness: 7/8 inch (19 mm).

2.4 MATERIALS

A. General:

1. Recycled Content of Sound-Absorbing Ceiling Units: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 35 percent.

2. Regional Materials: Sound-absorbing ceiling units shall be manufactured within 500 miles (800 km) of Project site.

B. Facing Material: Fabric from same dye lot; color and pattern as selected by Architect from manufacturer's full range.

1. Applied Treatments: Anti-microbial.

C. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit.

2.5 FABRICATION

A. General: Use manufacturer's standard construction except as otherwise indicated, with facing material applied to face, edges, and back border of dimensionally stable core and with rigid edges to reinforce panel perimeter against warpage and damage.

B. Measure each area and establish layout of panels and joints of sizes indicated on Drawings within a given area.

C. Glass-Fiber Board Cores: Chemically harden core edges and areas of core where mounting devices are attached.

D. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.

1. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches adjacent units.

E. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch (1.6 mm).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install sound-absorbing ceiling units in locations indicated with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

B. Comply with sound-absorbing ceiling unit manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

C. Align fabric pattern and grain with adjacent units.

D. Clip loose threads; remove pills and extraneous materials.

E. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 098436

SECTION 099123 – INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Steel.

2. Galvanized metal.

3. Gypsum board.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Initial Selection: For each type of topcoat product indicated.

C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.3 QUALITY ASSURANCE

A. MPI Standards:

1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."

2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.

2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co. Eco Spec

2. Sherman Williams

3. ICI Dulux

4. Or approved equal.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.

2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.

3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.

4. Floor Coatings: VOC not more than 100 g/L.

5. Shellacs, Clear: VOC not more than 730 g/L.

6. Shellacs, Pigmented: VOC not more than 550 g/L.

7. Flat Topcoat Paints: VOC content of not more than 50 g/L.

8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.

9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.

10. Floor Coatings: VOC not more than 100 g/L.

11. Shellacs, Clear: VOC not more than 730 g/L.

12. Shellacs, Pigmented: VOC not more than 550 g/L.

13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.

14. Dry-Fog Coatings: VOC content of not more than 400 g/L.

15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.

16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.

C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:

1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

2. Restricted Components: Paints and coatings shall not contain any of the following:

a. Acrolein.
b. Acrylonitrile.
c. Antimony.
d. Benzene.
e. Butyl benzyl phthalate.
f. Cadmium.
g. Di (2-ethylhexyl) phthalate.
h. Di-n-butyl phthalate.
i. Di-n-octyl phthalate.
j. 1,2-dichlorobenzene.
k. Diethyl phthalate.
l. Dimethyl phthalate.
m. Ethylbenzene.
n. Formaldehyde.
o. Hexavalent chromium.
p. Isophorone.
q. Lead.
r. Mercury.
s. Methyl ethyl ketone.
t. Methyl isobutyl ketone.

u. Methylene chloride.
v. Naphthalene.
w. Toluene (methylbenzene).
x. 1,1,1-trichloroethane.
y. Vinyl chloride.

D. Colors: As indicated in a color schedule.

2.3 PRIMERS/SEALERS

A. Interior Latex Primer/Sealer: MPI #50.

1. VOC Content: E Range of E1 or E2.

B. Interior Alkyd Primer/Sealer: MPI #45.

1. VOC Content: E Range of E1 or E2.

C. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.

2.4 METAL PRIMERS

A. Alkyd Anticorrosive Metal Primer: MPI #79.

1. VOC Content: E Range of E1.

B. Quick-Drying Alkyd Metal Primer: MPI #76.

1. VOC Content: E Range of E1.

C. Rust-Inhibitive Primer (Water Based): MPI #107.

1. VOC Content: E Range of E1.

D. Cementitious Galvanized-Metal Primer: MPI #26.

1. VOC Content: E Range of E1.

E. Waterborne Galvanized-Metal Primer: MPI #134.

1. VOC Content: E Range of E1.

F. Vinyl Wash Primer: MPI #80.

1. VOC Content: E Range of E2.

G. Quick-Drying Primer for Aluminum: MPI #95.

1. VOC Content: E Range of E1.

2.5 WOOD PRIMERS

A. Interior Latex-Based Wood Primer: MPI #39.

1. VOC Content: E Range of E1 or E2.

2.6 LATEX PAINTS

A. Interior Latex (Flat): MPI #53 (Gloss Level 1).

1. VOC Content: E Range of E3.

B. Interior Latex (Low Sheen): MPI #44 (Gloss Level 2).

1. VOC Content: E Range of E2.

C. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).

1. VOC Content: E Range of E1 or E2.

D. Interior Latex (Satin): MPI #43 (Gloss Level 4).

1. VOC Content: E Range of E1 or E2.

E. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).

1. VOC Content: E Range of E1.

F. Interior Latex (Gloss): MPI #114 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).

1. VOC Content: E Range of E1.

G. Institutional Low-Odor/VOC Latex (Flat): MPI #143 (Gloss Level 1).

1. VOC Content: E Range of E3.

H. Institutional Low-Odor/VOC Latex (Eggshell): MPI #145 (Gloss Level 3).

1. VOC Content: E Range of E1 or E2.

I. Institutional Low-Odor/VOC Latex (Semigloss): MPI #147 (Gloss Level 5).

1. VOC Content: E Range of E1.

J. High-Performance Architectural Latex (Semigloss): MPI #141 (Gloss Level 5).

1. VOC Content: E Range of E1.

K. Exterior Latex (Flat): MPI #10 (Gloss Level 1).

1. VOC Content: E Range of E1.

L. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).

1. VOC Content: E Range of E0.

M. Exterior Latex (Gloss): MPI #119 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).

1. VOC Content: E Range of E0.

2.7 ALKYD PAINTS

A. Interior Alkyd (Flat): MPI #49 (Gloss Level 1).

1. VOC Content: E Range of E3.

B. Interior Alkyd (Eggshell): MPI #51 (Gloss Level 3).

1. VOC Content: E Range of E1 or E2.

C. Interior Alkyd (Semigloss): MPI #47 (Gloss Level 5).

1. VOC Content: E Range of E1.

D. Interior Alkyd (Gloss): MPI #48 (Gloss Level 6).

1. VOC Content: E Range of E1.

2.8 QUICK-DRYING ENAMELS

A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).

1. VOC Content: E Range of E1.

B. Quick-Drying Enamel (High Gloss): MPI #96 (Gloss Level 7).

1. VOC Content: E Range of E1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.

2. Masonry (Clay and CMU): 12 percent.

3. Wood: 15 percent.

4. Gypsum Board: 12 percent.

5. Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.

1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.

B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.

F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

G. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.

2. Sand surfaces that will be exposed to view, and dust off.

3. Prime edges, ends, faces, undersides, and backsides of wood.

4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

L. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.

2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Mechanical and Electrical Work: Paint items exposed in exposed ceilings in occupied spaces including, but not limited to, the following:

1. Mechanical Work:

a. Uninsulated metal piping.
b. Uninsulated plastic piping.
c. Pipe hangers and supports.
d. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
e. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Exposed ductwork is NOT to be painted.

3. Electrical Work: Paint items exposed at ceiling in occupied spaces including, but not limited to, the following:

    a. Electrical equipment that is indicated to have a factory-primed finish for field painting.
    b. Exposed conduit at ceiling.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.

2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.1S.

a. Prime Coat: Rust-inhibitive primer (water based).
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
c. Topcoat: Institutional low-odor/VOC interior latex (semigloss).
d. Performance architectural latex (semigloss).

B. Galvanized-Metal Substrates:

1. Institutional Low-Odor/VOC Latex System: MPI INT 5.3N.

a. Prime Coat: Waterborne galvanized-metal primer.
b. Intermediate Coat: Institutional low-odor/VOC interior latex matching topcoat.
c. Topcoat: Institutional low-odor/VOC interior latex (semigloss).

C. Gypsum Board Substrates:

1. Low-Odor/VOC Latex System: MPI INT 9.2A.

a. Prime Coat: Interior latex primer/sealer.
b. Intermediate Coat: Low-odor/VOC interior latex matching topcoat.
c. Topcoat: Low-odor/VOC interior latex (eggshell).

END OF SECTION 099123

DIVISION 10 – SPECIALTIES

SECTION 102113 – TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel toilet compartments configured as toilet enclosures and urinal screens.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.

1. Electrolytically Zinc Coated: ASTM A 879/A 879M, 01Z (03G).

2. Hot-Dip Galvanized: ASTM A 653/A 653M, either hot-dip galvanized or galvannealed.

B. Zamac: ASTM B 86, commercial zinc-alloy die castings.

2.2 STEEL UNITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:

1. Accurate Partitions Corporation.

2. All American Metal Corp.

3. American Sanitary Partition Corporation.

4. Ampco, Inc.

5. Bradley Corporation; Mills Partitions.

6. General Partitions Mfg. Corp.

7. Global Steel Products Corp.

8. Knickerbocker Partition Corporation.

9. Sanymetal; a Crane Plumbing Company.

10. Or approved equal.

C. Toilet-Enclosure Style: Floor anchored.

D. Urinal-Screen Style: Wall hung, flat panel.

E. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.

1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch (25 mm) for doors and panels and 1-1/4 inches (32 mm) for pilasters.
2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

F. Urinal-Screen Construction:

1. Flat-Panel Urinal Screen: Matching panel construction.

G. Facing Sheets and Closures: Electrolytically coated or hot-dip galvanized-steel sheet with nominal base-metal (uncoated) thicknesses standard with manufacturer.

H. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 3 inches (76 mm) high, finished to match hardware.

I. Brackets (Fittings):

1. Stirrup Type: Ear or U-brackets; chrome-plated zamac.

J. Steel-Sheet Finish: Manufacturer's standard baked-on finish, with one color in each room.

1. Color: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
1. Material: Chrome-plated zamac.

2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.

3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.

4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.

5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.

6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

C. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.

D. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.

E. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.

F. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

B. Clearances: Maximum 1/2 inch (13 mm) between pilasters and panels; 1 inch (25 mm) between panels and walls.

C. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

3.2 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

SECTION 102238 – OPERABLE PANEL PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manually operated, acoustical panel partitions.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For operable panel partitions.

1. Include plans, elevations, sections, details, and attachments to other work.

2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.

3. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.

C. Product certificates.

D. Product test reports.

E. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

C. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:

1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.

2. Noise-Reduction Requirements: Operable panel partition assembly, identical to partition tested for STC, tested for sound-absorption performance according to ASTM C 423, and rated for not less than the NRC indicated.

B. Fire-Test-Response Characteristics: Provide panels with finishes complying with one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency.

    a. Flame-Spread Index: 25 or less.
    b. Smoke-Developed Index: 450 or less.

2. Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.2 OPERABLE ACOUSTICAL PANELS

A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

2. Basis-of-Design Product: Subject to compliance with requirements, provide Panelfold Sonicwal 1212 with Woventex fabric or comparable product by one of the following:

    a. KWIK-WALL Company.
    b. Moderco Inc.
    c. Modernfold, Inc.
    d. Panelfold Inc.
    e. Or approved equal.

B. Panel Operation: Manually operated, individual panels.

C. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.

E. STC: Not less than 45.

F. NRC: Not less than 0.65.

1. Steel Frame: Steel sheet, manufacturer's standard thickness.

2. Steel Face/Liner Sheets: Tension-leveled steel sheet, manufacturer's standard thickness.

3. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; manufacturer's standard strengths and thicknesses for type of use.

4. Gypsum Board: ASTM C 1396/C 1396M.

5. Cement Board: ASTM C 1288.

6. Particleboard: ANSI A208.1.

7. Medium-Density Fiberboard: ANSI A208.2.

8. Plywood: DOC PS 1.

9. Composite Wood Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

G. Panel Closure: Manufacturer's standard.

H. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.

2.3 SEALS

A. General: Provide seals that produce operable panel partitions complying with performance requirements and the following:

1. Seals made from materials and in profiles that minimize sound leakage.

2. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.

B. Horizontal Bottom Seals: Manufacturer's standard continuous-contact seal exerting uniform constant pressure on floor.

C. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.

2.4 PANEL FINISH FACINGS

A. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.

1. Color/Pattern: As selected by Architect from manufacturer's full range.

B. Fabric Wall Covering: 100 percent polyolefin woven fabric, from same dye lot, treated to resist stains.

C. Paint: Manufacturer's standard factory-painted finish.

D. Cap-Trimmed Edges: Protective perimeter-edge trim with tight hairline joints concealing edges of panel and finish facing.

E. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.5 SUSPENSION SYSTEMS

A. Tracks: Steel or aluminum with adjustable steel hanger rods for overhead support, designed for operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.54 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

C. Track Intersections, Switches, and Accessories: As required for operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel or aluminum.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.

B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.

C. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

D. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

E. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids. Adjust partitions for alignment and full closure of vertical joints and full closure along top and bottom seals.

3.2 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 102238

SECTION 102800 – TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.

2. Public-use shower room accessories.

3. Underlavatory guards.

4. Custodial accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PUBLIC-USE WASHROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. A & J Washroom Accessories, Inc.
   2. American Specialties, Inc.
   3. Bobrick Washroom Equipment, Inc.
   4. Bradley Corporation.
   5. Approved equal.

C. Toilet Tissue (Roll) Dispenser:
   1. Basis-of-Design Product: American Specialites 0030
   2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
   3. Mounting: Surface mounted.
   4. Operation: Noncontrol delivery with theft-resistant spindle.
   5. Capacity: Designed for 5-inch- (127-mm-) diameter tissue rolls.
   6. Material and Finish: Stainless steel, No. 4 finish (satin).

D. Waste Receptacle:
   1. Basis-of-Design Product: American Specialties 0811
   2. Mounting: Freestanding.
   3. Minimum Capacity: 13 gal.
   4. Material and Finish: Stainless steel, No. 4 finish (satin).
   5. Liner: Reusable vinyl liner.

6. Lockset: Tumbler type for waste-receptacle.

E. Liquid-Soap Dispenser:

1. Basis-of-Design Product: American Specialties 9343

2. Description: Designed for dispensing soap in liquid or lotion form.

3. Mounting: Vertically oriented, surface mounted.

4. Capacity: 48 oz.

5. Materials: 18-8 Stainless Steel

6. Lockset: Tumbler type.

7. Refill Indicator: Window type.

F. Grab Bar:

1. Basis-of-Design Product: American Specialties 3200

2. Mounting: Flanges with concealed fasteners.

3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.

a. Finish: Smooth, No. 4, satin finish.

4. Outside Diameter: 1-1/2 inches (38 mm).

5. Configuration and Length: As indicated on Drawings.

G. Sanitary-Napkin Disposal Unit:

1. Basis-of-Design Product: American Specialties 0852

2. Mounting: Surface mounted.

3. Door or Cover: Self-closing disposal-opening cover.

4. Receptacle: Removable.

5. Material and Finish: Stainless steel, No. 4 finish (satin).

H. Mirror Unit:

1. Basis-of-Design Product: American Specialties 0600

2. Frame: Stainless-steel channel

a. Corners: Welded and ground smooth.

3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.

a. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

4. Size: As indicated on Drawings.

2.2 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. A & J Washroom Accessories, Inc.

2. American Specialties, Inc.

3. Bobrick Washroom Equipment, Inc.

4. Bradley Corporation.

5. Kohler

6. Or approved equal.

C. Shower Curtain Rod:

1. Description: 1-1/4-inch (32-mm) OD; fabricated from nominal 0.05-inch-(1.3-mm-) thick stainless steel.

2. Mounting Flanges: Stainless-steel flanges designed for exposed fasteners.

3. Finish: No. 4 (satin).

D. Shower Curtain:

1. Size: Minimum 6 inches (152 mm) wider than opening by 72 inches (1828 mm) high.

2. Material: Nylon-reinforced vinyl, minimum 10 oz. (284 g) or 0.008-inch-(0.2-mm-) thick vinyl, with integral antibacterial agent.

3. Color: White.

4. Grommets: Corrosion resistant at minimum 6 inches (152 mm) o.c. through top hem.

5. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

2.3 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Plumberex Specialty Products, Inc.

2. Truebro by IPS Corporation.

3. Zurn.

4. Or approved equal.

C. Underlavatory Guard:

1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.

2. Material and Finish: Antimicrobial, molded plastic, white.

2.4 CUSTODIAL ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. A & J Washroom Accessories, Inc.

2. American Specialties, Inc.

3. Bobrick Washroom Equipment, Inc.

4. Bradley Corporation.

5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

6. Or approved equal.

C. Utility Shelf

1. Description: With exposed edges turned down not less than 1/2 inch (13 mm) and supported by two triangular brackets welded to shelf underside.

2. Size: 16 inches (406 mm) long by 6 inches (152 mm) deep.

3. Material and Finish: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel, No. 4 finish (satin).

D. Mop and Broom Holder:

1. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.

2. Length: 36 inches (914 mm).

3. Hooks: Three.

4. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.

5. Material and Finish: Stainless steel, No. 4 finish (satin).

a. Shelf: Not less than nominal 0.05-inch- (1.3-mm-) thick stainless steel.
b. Rod: Approximately 1/4-inch- (6-mm-) diameter stainless steel.

E. Paper Towel (Roll) Dispenser:

1. Description: Lever-actuated mechanism permits controlled delivery of paper rolls in preset lengths per stroke.

2. Mounting: Surface mounted.

3. Minimum Capacity: 8-inch- (203-mm-) wide, 800-foot- (244-m-) long roll.

4. Material and Finish: ABS plastic, gray.

5. Lockset: Tumbler type.

F. Liquid-Soap Dispenser:

1. Description: Designed for dispensing soap in liquid or lotion form.

2. Mounting: Vertically oriented, surface mounted.

3. Lockset: Tumbler type.

4. Refill Indicator: Window type.

2.5 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of four keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

END OF SECTION 102800

DIVISION 12 – FURNISHINGS

SECTION 122116 – VERTICAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes vertical louver blinds with PVC vanes.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and installation details for vertical louver blinds.

1. Motorized Operators: Include details of installation and diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 VERTICAL LOUVER BLINDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:

1. Hunter Douglas Contract.

2. Levolor Contract; a Newell Rubbermaid company.

3. Springs Window Fashions.

4. Or approved equal.

C. PVC Vanes: Lead-free, UV-stabilized; with not less than 3/8-inch (9.5-mm) overlap when vanes are rotated fully closed.

1. Width: 3-1/2 inches (89 mm).

2. Profile: Flat.

3. Flame-Resistance Rating: Comply with NFPA 701; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

4. Features:

a. Bottom chain.

D. PVC and Fabric Insert Vanes: Lead-free, UV-stabilized; with not less than 3/8-inch (9.5-mm) overlap when vanes are rotated fully closed. Provide integrally colored, opaque vane with clear grooves for holding fabric insert.

1. Width: 3-1/2 inches (89 mm).

E. Headrail: Encloses operating mechanisms including carrier-spacing mechanism that provides uniform vane spacing when blinds are traversed fully across headrail (closed).

1. Manual Traverse Control: Nickel-plated metal bead chain.
2. Manual Rotation Control: Nickel-plated metal bead chain.

3. Draw and Stack: One way.
4. Cord-Tensioner Mounting: Wall or Sill.

F. Carriers: Engineered plastic with gears to align and synchronize vane rotation and stems that allow vane removal and replacement. Lead carriers have self-lubricating wheels or elongated bearing surfaces; following carriers have self-lubricating wheels.

G. Valance: Manufacturer's standard with vane insert.

H. Mounting Brackets: With spacers and shims required for blind placement and alignment indicated.

1. Type: Overhead.

2. Intermediate Support: Provide intermediate support brackets to produce support spacing recommended by blind manufacturer for weight and size of blind.

I. Colors, Textures, and Patterns:

1. Vanes:

a. PVC: As selected by Architect from manufacturer's full range.

2. Components: Provide materials exposed to view matching or coordinating with PVC vanes unless otherwise indicated.

2.2 VERTICAL LOUVER BLIND FABRICATION

A. Product Safety Standard: Fabricate vertical louver blinds to comply with WCMA A 100.1 including requirements for corded, flexible, looped devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to cover window and other openings as follows, measured at 74 deg F (23 deg C):

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which blind is installed less 1/4 inch (6 mm) per side or 1/2 inch (13 mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which blind is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).

2. Outside of Jamb Installation: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, and other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Install vertical louver blinds level and plumb, aligned and centered on openings, and aligned with adjacent units according to manufacturer's written instructions.

1. Locate so exterior vane edges are not closer than 2 inches (51 mm) from interior faces of glass and not closer than 1-1/2 inches (38 mm) from interior faces of glazing frames through full operating ranges of blinds.

2. Install mounting and intermediate brackets to prevent deflection of headrails.

3. Install with clearances that prevent interference with adjacent blinds, adjacent construction, and operating hardware of glazed openings, other window treatments, and similar building components and furnishings.

C. Electrical Connections: Connect motorized operators to building electrical system.

D. Adjust vertical louver blinds to operate free of binding or malfunction through full operating ranges.

E. Clean vertical louver blind surfaces after installation according to manufacturer's written instructions.

END OF SECTION 122116

SECTION 123216 – MANUFACTURED PLASTIC-LAMINATE-FACED CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes plastic-laminate-faced cabinets of stock design.

B. Related Requirements:

1. Section 123661 "Simulated Stone Countertops."

1.2 DEFINITIONS

A. Definitions in the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" apply to the work of this Section.

B. MDF: Medium-density fiberboard.

C. Hardwood Plywood: A panel product composed of layers or plies of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive, and faced both front and back with hardwood veneers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples: For cabinet finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Delamination of components or other failures of glue bond.
b. Warping of components.
c. Failure of operating hardware.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain plastic-laminate-faced cabinets from single manufacturer.

2.2 CASEWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.

1. Grade: Custom.

2. Provide certificates from AWI certification program indicating that casework complies with requirements of grades specified.

B. Product Designations: Drawings indicate configurations of manufactured plastic-laminate-faced cabinets by referencing designations of Casework Design Series numbering system in Appendix A of the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

2.3 CASEWORK

A. Design:

1. Flush overlay.

B. Exposed Materials:

1. Plastic Laminate: Grade HGS.

a. Colors and Patterns: Match architect’s sample.

2. Unless otherwise indicated, provide specified edgebanding on all exposed edges.

C. Semiexposed Materials:

1. Thermoset Decorative Panels: Provide thermoset decorative panels for semiexposed surfaces unless otherwise indicated.

a. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.

2.4 MATERIALS

A. Hardwood Plywood: HPVA HP-1, particleboard core except where veneer core is indicated.

B. Softwood Plywood: DOC PS 1.

C. Particleboard: ANSI A208.1, Grade M-2.

D. MDF: ANSI A208.2, Grade 130.

E. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:

a. ABET Inc.
b. Formica Corporation.
c. Lamin-Art, Inc.
d. Wilsonart International.
e. Or approved equal.

F. Edgebanding for Plastic Laminate: Plastic laminate matching adjacent surfaces.

G. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

H. Edgebanding for Thermoset Decorative Panels: PVC or polyester edgebanding matching thermoset decorative panels.

2.5 COLORS AND FINISHES

A. Plastic-Laminate Colors, Patterns, and Finishes: Match architect’s sample.

2.6 CASEWORK HARDWARE AND ACCESSORIES

A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.

1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Frameless Concealed Hinges (European Type): BHMA A156.9, Type B01602, 100 degrees of opening, self-closing. Provide two hinges for doors less than 48 inches (1220 mm) high, and provide three hinges for doors more than 48 inches (1220 mm) high.

C. Pulls: Solid satin chrome-plated brass wire pulls, fastened from back with two screws. For sliding doors, provide recessed satin chrome-plated flush pulls. Provide two pulls for drawers more than 24 inches (600 mm) wide.

D. Drawer Slides: BHMA A156.9, Type B05091.

PART 3 - EXECUTION

3.1 CASEWORK INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Install casework level, plumb, and true; shim as required, using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch (1.5 mm) of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm). Bolt adjacent cabinets together with joints flush, tight, and uniform.

D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch (1.5 mm) of a single plane. Fasten to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch (1.5 mm).

E. Fasten cabinets to adjacent cabinets and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."

F. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.2 CLEANING

A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 123216

SECTION 123661 – SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-surface-material countertops and backsplashes.

1.2 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

A. Configuration: Provide countertops with the following front and backsplash style:

1. Front: Straight, slightly eased at top.

2. Backsplash: Straight, slightly eased at corner.

3. Endsplash: Matching backsplash.

B. Countertops: 3/4-inch- (19-mm-) thick, solid surface material with front edge built up with same material.

C. Countertops: 1/4-inch- (6.4-mm-) thick, solid surface material laminated to 3/4-inch- (19-mm-) thick particleboard with exposed edges built up with 3/4-inch- (19-mm-) thick, solid surface material.

D. Backsplashes: 3/4-inch- (19-mm-) thick, solid surface material.

2.2 COUNTERTOP MATERIALS

A. Certified Wood Materials: Fabricate countertops with wood and wood-based products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

B. Composite Wood and Agrifiber Products: Provide products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers," including 2004 Addenda.

C. Particleboard: ANSI A208.1.

D. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

E. Adhesives: Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Avonite Surfaces.
b. Formica Corporation.
c. Meganite Inc.
d. Wilsonart International.
e. Or approved equal.

2. Type: Provide Standard Type unless Special Purpose Type is indicated.

3. Sink Bowls: Undermount vitreous, refer to plumbing specification 22 42 00.

4. Colors and Patterns: Match Architect's samples.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

END OF SECTION 123661

SECTION 125900 – SYSTEMS FURNITURE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Work Surfaces.

B. Legs and Uprights.

C. Panels.

D. Overhead Storage.

E. Accessories.

1.2 RELATED SECTIONS

A. Division 16 - Electrical: Electrical utility service fittings.

B. Division 16 - Electrical: Electronic control service outlets.

1.3 REFERENCES

A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials

B. ANSI/HFES 100-2007, Human Factors Engineering of Computer Workstations.

C. ANSI/BIFMA - American National Standard for Office Furnishings.

D. ANSI A208.1 - Particleboard Standard.

E. ANSI/BIFMA X5.5 - American National Standard For Office Furnishings-Desk Products

F. NEMA LD 3 - High Pressure Decorative Laminates.

G. ADA Accessibility Guidelines for Buildings and Facilities.

1.4 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

C. Shop Drawings: Indicate casework locations, large scale plans, elevations, cross sections, rough-in and anchor placement dimensions and tolerances, clearances required. Show component dimensions, configurations, construction details, joint details, and attachments, utility and service requirements and locations.

D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

E. Verification Samples: For each finish product specified, two samples, minimum size 6 inches (150 mm) square, representing actual product, color, and patterns.

F. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Company specializing in performing Work of this section with minimum three years documented experience and approved by manufacturer.

C. Mock-Up: Provide a mock-up for evaluation of workspace arrangement, ergonomics and application workmanship.

1. Provide in area designated by Architect.

2. Do not proceed with remaining work until layout, workmanship, and color are approved by Architect.

3. Rework mock-up area as required to produce acceptable work.

4. Accepted mock-ups shall be comparison standard for remaining Work.

1.6 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to commencing work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Accept console components on site. Inspect on arrival for damage.

C. Store products clear of floor in manner to prevent damage.

D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance to requirements of local authorities having jurisdiction.

1.8 SEQUENCING AND COORDINATION

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

B. Coordinate casework installation with size, location and installation of service utilities.

1.9 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.10 WARRANTY

A. 10-year warranty for manufacturer manufactured products to the original owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Steelcase series 9000 refurbished, refer to furniture schedule in drawings.

B. HON

C. Knoll

D. Teknion

E. Or approved equal.

F. Requests for substitutions will be considered in accordance to provisions of Section 012500.

2.2 APPLICATIONS/SCOPE

A. Applications Type: Modular desk and workstation system: Modular, freestanding, steel based scalable and reconfigurable workstation system.

1. Open Office Systems.

2. Private Office Systems.

B. Design Elements:

1. Work Surface:

    a. Straight work surface.
    b. Corner work surface.
    c. Corner transition work surface.
    d. Jetty work surface.

2. Legs and Uprights:

    a. Standard leg.

3. Panels:

    a. Organizer panel.
    b. Modesty panel.

4. Overhead Storage:

    a. Overhead compartment shell.
    b. Flipper doors.
    c. Transaction shelf. (Reception Desk)

5. Chairs

6. Accessories as requested by owner, may include:

    a. Lighting.
    b. Flat Panel Display Arms.
    c. Keyboard Trays.
    d. PC Storage.

2.3 MODULAR DESK AND WORKSTATION SYSTEM

A General:

1. Arrangements shall be comprised of basic components that can be seamlessly combined to create an unlimited array of workspaces.

2. Workspaces shall meet ANSI-BIFMA, BSR/HFES 100, and ADA guidelines and requirements where required.

B. Configuration:

1. See Drawings for workspace configuration.

C. Work Surfaces:

1. Materials:

a. Wood Core: Constructed of 45 Lb/Ft3 particleboard that meets or exceeds ANSI A208.1-99/Grade M-2.
1) Finish: Decorative laminate on top and equivalent backer sheet on the underside.
a) Edge: Full T-mold with 0.6 inch radius leading edge and a 0.1 inch (2.54 mm) thick vinyl extrusion secondary flat edge banding.
2) Thickness: 1.2 inches (38.1 mm).

2. Straight work surface:

a. General:
1) Straight work surfaces shall attach between two legs supported by a stretcher. Straight work surfaces are used to create a standalone desk or connect flanking work surfaces of the same depth.
b. Sizes:
1) Match basis of design.

3. Corner work surfaces:

a. General:
1) Corner work surfaces shall attach between a corner leg and two legs supported by two stretchers. Corner work surfaces can be used to create a standalone desk or connect flanking work surfaces of the same depth.

b. Sizes:
   1) Corner work surfaces shall be available in left hand widths and right hand widths of 24 to 72 inches (610 to 1829 mm) in 6 inch (152 mm) increments. Widths can be different. Corner work surfaces have symmetrical left and right hand depths of 18, 24, or 30 inches (457, 610, or 762 mm).
   2) Maximum corner work surface width shall be 48 by 72 inches (1219 by 1829 mm) or 72 by 48 inches (1829 by 1219 mm).

4. Corner transition work surface:

   a. General:
      1) Corner transition work surfaces shall attach between a corner leg and two legs supported by two stretchers. Corner transition work surfaces connect Work Surfaces of different depths.
   b. Sizes:
      1) Corner transition work surfaces shall be available in left hand widths and right hand widths of 24 to 72 inches (610 to 1829 mm) in 6 inch (152 mm) increments. The deeper end has a depth of 24, or 30 inches (610 or 762 mm).
      2) Maximum corner transition work surface width shall be 48 by 72 inches (1219 by 1829 mm) or 72 by 48 inches (1829 by 1219 mm).

5. Jetty work surface:

   a. General:
      1) Jetty work surfaces shall attach between two legs supported by a stretcher, and a peninsula leg. A jetty work surface can be used at the end of any 24 or 30 inch (610 or 762 mm) deep work surface. The exterior end of a jetty shall be the end of a workspace and does not connect to any other work surface.
   b. Sizes:
      1) Jetty work Surfaces shall be available in a width of 48 inches (1219 mm) and connecting depths of 24 or 30 inches (610 or 762 mm) and an overall depth of 72 inches (1829 mm). The distance between the standard legs is about 14 inches less than the overall width.

6. Legs and uprights:

   a. As required to match basis of design

7. Panels:
    a. As required to match basis of design.

D. Doors:

1. Flipper doors:

    a. Match basis of design.

2. Shelf:

    a. Match basis of design.

E. Finish Trim Pieces:

1. Wire Way Covers:

    a. Final selection by owner from standard options.

2. Top Caps:

    a. Final selection by owner from standard options.

F. Chairs:

1. Match basis of design.

G. Accessories:

1. Lighting:

    a. As requested by owner from standard selection.

2. Flat panel display arms:

    a. As requested by owner from standard selection.

3. Keyboard trays:

    a. As requested by owner from standard selection.

4. PC storage:

    a. As requested by owner from standard selection.

2.4 MATERIALS

A. Steel:

1. General:

a. Fully welded design using 14 gauge and 16 gauge, cold rolled steel.

2. Finish:

a. Uniform application of epoxy powder coated paint.

3. Colors:

a. To be selected from manufacturers standard color selections.
b. Match architect's samples.

B. Extruded Aluminum:

1. Slatwall 6063-T6 extruded aluminum, fully anodized, black in color.

C. Fabrics:

1. General:

a. Fabrics to meet or exceed ÅSTM E-84, Class 1 or A flammability rating and state of California Technical Bulletin 117 SEC. E (CS=191-53).
b. Manufactured from 100% recycled polyester.
c. Colorfastness to light: 40 hours.
d. Colorfastness to crocking: Class 4 min. dry or class 3 min. wet.

2. Colors:

a. To be selected from manufacturers standard color selections to coordinate with color selection in Basis of Design.

D. Decorative Laminates:

1. General: Meet or exceed performance standards per ANSI/NEMA publication LD3-2005 and comply with U.S. Federal specification L-P 508H and National Sanitation Foundation Number 35 Specification.

2. Colors:

a. To be selected from manufacturers standard color selections to coordinate with color selection in Basis of Design.

2.5 FABRICATION

A. Fabricate casework, assembled and welded.

B. Fabricate corners and joints without gaps or inaccessible spaces or areas where dirt or moisture could accumulate.

C. Fabricate components, drawers, doors, shelves, [counters, and similar elements of die formed sheet steel. Form each unit rigid, not dependent on building structure or adjacent units for rigidity.

D. Form edges and seams smooth. Form material for counter tops, facing, shelves, and similar elements from continuous sheets.

E. Cut and drill counter tops, backs, and other components for service fittings and outlets.

F. Install fixtures and fittings built into or part of casework. Provide access panels for maintenance of utility service and mechanical and electrical components.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. Verify adequacy of supports, framing and anchors.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install module, components and accessories in accordance to manufacturer's instructions.

B. Use anchoring devices to suit conditions and substrate materials encountered.

C. Set casework items plumb and square, securely anchored to building structure.

D. Insulate as required to prevent electrolysis between dissimilar metals.

E. Scribe to abutting surfaces and align adjoining components. Apply matching filler pieces where casework abuts dissimilar construction.

F. Close ends of units, aprons, shelves and bases.

3.4 ADJUSTING

A. Adjust doors, drawers, hardware, fixtures, and other moving or operating parts to function smoothly.

3.5 CLEANING

A. Remove protective covering from finished surfaces.

B. Wash and clean equipment.

C. Polish glass, plastic, hardware, accessories, fixtures, and fittings.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.7 SCHEDULES

A. Refer to architectural drawings.

END OF SECTION 125900

DIVISION 13 – SPECIAL CONSTRUCTION

SECTION 134400 – MEZZANINE SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Indicating types, quantities, sizes, and installation locations of each component required.

1.3 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.5 WARRANTY

A. Warranty:

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MEZZANINE SYSTEM

A. The mezzanine system shall be custom designed for a uniform live load as specified by the owner and shall meet all requirements of IBC and/or local building codes. All designs, calculations and drawings are to be prepared under the supervision of a registered Professional Engineer who shall be a full-time employee of the mezzanine manufacturer. PE stamps shall appear on all calculations and drawings.

2.2 DESCRIPTION

A. The custom mezzanine system shall consist, in general, of columns, framing, decking, hardware, accessories and paint finish as specified in this document.

2.3 DESIGN CRITERIA

A. Mezzanine system shall be designed for a minimum 125 PSF live load. Mezzanine system shall be designed for a minimum 7 foot clear height (exact clear height and top of deck shall be designed to meet specific clearance requirements for space below). Mezzanine shall be designed to meet seismic zone requirements for customer's geographic location.

2.4 INSTALLATION

A. Installation of the mezzanine system shall be per drawings and manuals provided by the mezzanine manufacturer. Installation shall be performed by factory trained or supervised personnel. If owner chooses to provide installation, factory supervision shall be available upon request. Mounting: Flanges with concealed fasteners.

2.5 PERMITS

A. If requested, the mezzanine manufacturer shall assist the owner in obtaining building permits for the mezzanine.

2.6 DECKING

A. Deck material shall be minimum 1-1/2", 20 gauge heavy duty roof deck painted light reflective white, meeting ASTM A611 Grade C requirements. The deck shall be covered with plywood flooring, high density wood, polytextured floor, poured concrete, steel floor plate or alternate surface as required by the owner. If grating is the deck material, it shall be 19W4 bar grating with minimum 1" x 1/8" bearing bars meeting NAAMM requirements.

2.7 STAIRS AND RAILING

A. Stairs shall be designed to meet riser and tread requirements of applicable codes. Stairs shall be shipped knocked down and treads shall be solid floor plate. Mezzanine rails and stair handrails are to consist of square tubing and shall be designed to meet strength and rail opening requirements of applicable codes.

PART 3 - ENGINEERING SPECIFICATIONS

3.1 BOLTED CHANNEL SYSTEM MATERIALS

A. Columns:

1. Mezzanine support shall be provided by square structural steel tubing meeting ASTM A500 Grade B, 46 ksi yield requirements. Columns are to be designed per AISC steel codes for vertical, lateral and seismic loadings (typical column sizes range from 5" x 5" to 8" x 8"). Support shall not be provided by building walls or columns and cross bracing shall not be required for lateral stability.

B. Framing:

1. Framing members shall be typically 12 gauge or heavier cold formed "C" channels meeting ASTM.

2. A570 Grade E, modified to 50 ksi yield requirements and are designed per AISI steel codes.

C. Framing Connections:

1. All stringers shall be mounted directly on top of mezzanine columns within factory welded support channels. Joist to stringer connections shall utilize factory welded hangers. When required by application, high strength bolts meeting ASTM A325 requirements shall be used.

3.2 BAR JOIST SYSTEM MATERIALS

A. Columns:

1. Mezzanine support shall be provided by square structural steel tubing meeting ASTM A500 Grade B, 46 ksi yield requirements. Columns are to be designed per AISC steel codes for vertical, lateral and seismic loadings (typical column sizes range from 5" x 5" to 8" x 8"). Support shall not be provided by building walls or columns and cross bracing shall not be required for lateral stability.

B. Framing:

1. Bar joist framing members shall be open web steel designed and manufactured to AISI and SJI specifications. Girders and beams shall be structural steel designed to meet ASTM requirements.

C. Fasteners:

1. Bar joist shall be fastened to girders and beams with 1/2" high strength steel bolts. Girders and beams shall be fastened to columns with ASTM A325 bolts.

3.3 PAINT FINISH

A. Mezzanine components shall feature a powder coated paint finish. The owner shall select from 14 standard powder coat colors or specify a special color of his choice.

END OF SECTION 134400

DIVISION 21 – FIRE SUPPRESSION

SECTION 210500 – COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

SCOPE
This section includes information common to two or more technical fire protection specification sections or items that are of a general nature, not conveniently fitting into other technical sections.

RELATED WORK
This section applies to all Division 21 sections of fire suppression.

REFERENCE
Applicable provisions of Division 1 govern work under this section.

STANDARDS
Abbreviations of standards organizations referenced in this and other sections are as follows:

AGA	American Gas Association
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASPE	American society of Plumbing Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
CGA	Compressed Gas Association
CS	Commercial Standards, Products Standards Sections, Office of Engineering Standards Service, NBS
EPA	Environmental Protection Agency
FS	Federal Specifications, Superintendent of Documents, U.S. Government Printing Office
IAPMO	International Association of Plumbing & Mechanical Officials
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
SPS	State of Wisconsin Dept. of Safety and Professional Services
MCA	Mechanical Contractors Association
MICA	Midwest Insulation Contractors Association
MSS	Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association

NFPA National Fire Protection Association
STI Steel Tank Institute
UL Underwriters Laboratories Inc.

QUALITY ASSURANCE
Substitution of Materials: Refer to Section 012500 Substitution Procedures.

All products and materials used are to be new, undamaged, clean and in good condition. Existing products and materials are not to be reused unless specifically indicated.

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and for obtaining the intended performance from the system into which these items are placed.

CONTINUITY OF EXISTING SERVICES
Do not interrupt or change existing services without prior written approval from the Owner's Project Representative. When interruption is required, coordinate scheduling of down-time with the Owner to minimize disruption to his activities. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.

PROTECTION OF FINISHED SURFACES
Refer to Division 1, General Requirements, Protection of Finished Surfaces.

SLEEVES AND OPENINGS
Refer to Division 1, General Requirements, Sleeves and Openings.

SEALING AND FIRESTOPPING
Sealing and firestopping of sleeves/openings between piping, etc. and the sleeve or structural opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and fireproofing. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation.

CODES
Comply with requirements of Wisconsin Administrative Code, Dept. of Safety and Professional Services, NFPA Standards and local Fire Chief or Fire Marshal (AHJ, Authority Having Jurisdiction) regarding design, materials and installation.

DESIGN CRITERIA
Design fire protection systems in accordance to codes, standards and regulations noted above.

Hydraulically design system for the most remote area based on the drawings, sheet F001

REQUEST AND CERTIFICATION FOR PAYMENT
Within 10 days after Notice to Proceed, the successful bidder will submit to the WisDOT Project Representative in a form prescribed below and by the General Conditions of the Contract - Scheduling and Coordination of Work, Reports, Records and Data, Payments to Contractor, a cost breakdown of the proposed values for work performed which, if approved by WisDOT, will become the basis for construction progress and monthly payments. The cost breakdown items shall reflect actual work progress stages as closely as feasible.

In addition, if payment is requested for approved off-site stored material, then that material shall be listed as a line item in the request and certification for payment cost breakdown.

CERTIFICATES AND INSPECTIONS
Refer also to Division 1, General Conditions, Permits, Regulations, Utilities and Taxes.

Obtain and pay for all required State or local installation inspections except those provided by the Architect/Engineer. Deliver originals of NFPA test certificates and WisDOT test reports to the Division's construction representative. Include copies of the certificates and reports in the Operating and Maintenance Instructions.

SUBMITTALS
Refer to Section 013300 Submittals.

Not more than two weeks after award of contract but before any shop drawings are submitted, contractor to submit the following fire suppression system data sheet. List piping material types, ASTM number, schedule or pressure class, joint type, manufacturer and model number where appropriate. List valves, specialties and equipment with manufacturer and model number. The approved fire protection system data sheet(s) will be made available to the Owners Project Representative for their use on this project.

FIRE SUPPRESSION SYSTEM DATA SHEET

Item	Pipe Service/Sizes	Manufacturer/Model No.	Remarks
Pipe			
Fittings			
Hangers & Supports			
Sprinkler Heads			
Valves			
Specialty Valves			
Pipe Specialties			
Fire Suppression Specialties			
Fire Suppression Equipment			

Shop drawing submittals are to be bound, labeled, contain the project manual cover page and a material index list page showing item designation, manufacturer and additional items supplied with the installation. Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Include wiring diagrams of electrically powered equipment.

Submittals shall be sent to the local Fire Chief or Fire Marshal for review prior to the Architect/Engineer. Include copy of review/approval letter in submission to Architect/Engineer.

Submit plans indicating water supply location and size, piping layout and size, sprinkler locations and type, hanger locations and type, equipment locations and type, valve locations and type, occupancy classes, hydraulic reference points, design areas and discharge densities.

Submit hydraulic calculations for water supply and sprinkler systems. Include summary sheet and detailed work sheets. Describe characteristics of water supply and location of effective point used in calculations. Include graph illustration of water supply, hose demand, sprinkler demand and in-rack sprinkler demand. Where a fire pump is used, graph primary rating point, secondary rating point and churn pressure of pump and combined water supply.

Submit sufficient quantities of data sheets and shop drawings to allow the following distribution:

- Operating and Maintenance Manuals : 2 copies
- WisDOT: 1 copy
- Architect/Engineer: 1 copy
- Local Fire Chief or Marshal: 1 copy

OPERATING AND MAINTENANCE INSTRUCTIONS

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

TRAINING OF OWNER PERSONNEL

Instruct Owner's personnel in the proper operation, maintenance and testing of systems and equipment provided as part of this project. Include not less than 2 hours of instruction, using the Operating and Maintenance manuals and record drawings during this instruction. Demonstrate testing, startup and shutdown procedures for all equipment. All training to be during normal working hours. Videotape all instructions and provide Owner with copy.

RECORD DOCUMENTS
Refer to Section 017839 Project Record Documents.

In addition to the data indicated in the General Requirements, maintain fire protection layout record drawings and hydraulic calculations on originals prepared by the installing contractor/subcontractor. Include copies of these record drawings and calculations with the Operating and Maintenance manuals.

PART 2 - PRODUCTS

ACCESS PANELS AND DOORS
Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration provided under Division 09 are sufficient; no additional access provisions are required unless specifically indicated.

PLASTER WALLS AND CEILINGS:
16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers, and similar wet areas, concealed hinges, screwdriver operated cam latch for general applications, key lock for use in public areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the equipment needing service; minimum size is 12" by 12".

IDENTIFICATION
STENCILS:
Not less than 1/2" high letters for pipe sizes 1" through 2-1/2" and 1 inch high letters/numbers for pipe sizes 3" and above for marking pipe and equipment. Apply flow arrows to piping.

ADHESIVE LABELS:
Pressure-sensitive, adhesive backed, vinyl pipe markers with applicable labeling, ¾" min. size for lettering and surrounding tape on both ends. With flow arrows on piping. Conforming to ANSI, ANSI and NFPA standards. Seton Opti-Code, MSI, Brady or approved equal. Clean piping before application.

SNAP-AROUND MARKERS:
One-piece, pre-formed, vinyl construction, snap-around or strap-around pipe markers with applicable labeling, ¾" min. size for lettering. Provide nylon ties on each end of pipe marker. Seton Setmark or approved equal.

SIGNS:
Metal construction, baked porcelain enamel finish signs, sizes conforming to NFPA No. 13 and 7-1.2, with holes and s-hooks/chains for hanging or securing. With applicable labeling. MSI, Seton, W.H. Brady or equal.

ENGRAVED NAME PLATES:
White letters on a black background, 1/16 inch thick plastic laminate, beveled edges, screw mounting, Setonply Style 2060 by Seton Name Plate Company or Emedolite Style EIP by EMED Co., or equal by W. H. Brady, or approved equal.

VALVE TAGS:
Round brass tags with 1/2 inch numbers, 1/4 inch system identification abbreviation, 1-1/4 inch minimum diameter, with brass jack chains with brass "S" hooks or one piece nylon ties around the valve stem, available from EMED Co., Seton Name Plate Company, MSI or W. H. Brady, or approved equal.

SEALING AND FIRESTOPPING
FIRE AND/OR SMOKE RATED PENETRATIONS:
Manufacturers: 3M, Hilti, STI/SpecSeal, Tremco, or approved equal.

All firestopping systems shall be provided by the same manufacturer.

Fire stop systems shall be UL listed or tested by an independent testing laboratory approved by the Department of Safety and Professional Services.

Submittals: Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgment can be based upon.

Use a product that has a rating not less than the rating of the wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.

Use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

NON-RATED PENETRATIONS:

Pipe Penetrations Through Below Grade Walls:

In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated pipe and the cored opening or a water-stop type wall sleeve. The operating bolts of the mechanical type seal shall be accessible from the building interior.

Pipe Penetrations:

At pipe penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between pipe insulation and sleeve. For non-rated drywall, plaster or wood partitions where sleeve is not required, use urethane caulk in annular space between pipe insulation and wall material.

PART 3 - EXECUTION

DEMOLITION

Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the User Agency to minimize disruption to the existing building occupants.

All pipe, sprinklers, equipment, wiring, associated conduit and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All designated equipment is to be turned over to the User Agency/Owner for his use at a place and time he so designates. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.

CUTTING AND PATCHING

Refer to Section 017329, Cutting and Patching.

BUILDING ACCESS

Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

EQUIPMENT ACCESS

Install all piping, conduit and accessories to permit access to equipment for maintenance and service. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Access doors in general construction are to be furnished by the Fire Protection Contractor and installed by the General Contractor.

Provide color coded thumb tacks or screws, depending on the surface, for use in accessible ceilings which do not require access panels.

COORDINATION
Coordinate all work with other contractors prior to installation. Any work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

Verify that all devices are compatible for the type of construction and surfaces on which they will be used.

IDENTIFICATION
Identify equipment in mechanical equipment rooms by stenciling equipment number and service with one coat of black enamel against a light background or white enamel against a dark background. Use a primer where necessary for proper paint adhesion.

Where stenciling is not appropriate for equipment identification, engraved name plates may be used.

Identify interior piping mains not less than once every 25 feet, not less than once in each room, adjacent to each access door or panel, and on both sides of the partition where exposed piping passes through walls or floors. Place flow directional arrows at each pipe identification location. Use one coat of black enamel against a light background or white enamel against a dark background, or approved pipe marking label systems, or provide snap-around type pipe markers as specified in Part 2 – Products.

Identify valves with signs per NFPA rulings.

Provide hydraulic design information sign of permanently marked weatherproof metal or engraved nameplate material. Secure to alarm valve with brass chain. Information to include location of the design areas, discharge densities, required flow and residual pressure at the base of riser, hose stream demand and sprinkler demand.

LUBRICATION
Lubricate all bearings with lubricant as recommended by the manufacturer before the equipment is operated for any reason. Once the equipment has been run, maintain lubrication in accordance to the manufacturer's instructions until the work is accepted by the Owner. Maintain a log of all lubricants used and frequency of lubrication; include this information in the Operating and Maintenance Manuals at the completion of the project.

SLEEVES
Provide galvanized sheet metal sleeves for fire rated pipe penetrations through interior and exterior walls to provide a backing for sealant or firestopping. Patch wall around sleeve to match adjacent wall construction and finish. Grout area around sleeve in masonry construction. In finished spaces where pipe penetration through wall is exposed to view, sheet metal sleeve shall be installed flush with face of wall. In existing poured concrete walls where penetration is core drilled, pipe sleeve is not required. Grout holes directly around steel pipe.

Pipe sleeves are not required in interior non-rated drywall, plaster or wood partitions and sleeves are not required in existing poured concrete walls where penetrations are core drilled.

Pipe sleeves in new poured concrete construction shall be schedule 40 steel pipe (sized to allow insulated pipe to run thru sleeve), cast in place.

In all piping floor penetrations, fire rated and non-fire rated, top of sleeve shall extend 1 inch above the adjacent finished floor. In existing floor penetrations, core drill sleeve opening large enough to insert schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. If the pipe penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the sleeve that will transfer weight to existing floor structure.

SEALING AND FIRESTOPPING
FIRE AND/OR SMOKE RATED PENETRATIONS:
Install approved product in accordance to the manufacturer's instructions where a pipe penetrates a fire/smoke rated surface. When pipe is insulated, use a product which maintains the integrity of the insulation and vapor barrier.

Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support substantial weight.

NON-RATED PARTITIONS:
At all interior partitions and exterior walls, pipe penetrations are required to be sealed. Apply sealant to both sides of the penetration in such a manner that the annular space between the pipe sleeve or cored opening and the pipe or insulation is completely blocked.

END OF SECTION 210500

SECTION 210529 – HANGERS AND SUPPORTS FOR FIRE SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

SCOPE
This section includes specifications for support of all fire suppression equipment and materials as well as piping system anchors.

RELATED WORK
Section 211000 – Water-Based Fire Suppression Systems

REFERENCE
Applicable provisions of Division 1 shall govern work under this section.

REFERENCE STANDARDS
MSS SP-58

NFPA 13	Installation of Sprinkler Systems (Latest prevailing edition).
NFPA 14	Installation of Standpipe and Hose Systems (Latest prevailing edition).
NFPA 20	Installation of centrifugal fire pumps (Latest prevailing edition).
UL	Underwriters' Laboratories Listed.
FM	Factory Mutual Approved

QUALITY ASSURANCE
Substitution of Materials Refer to Section 012500 Substitution Procedures.

DESCRIPTION
Provide all supporting devices as required for the installation of fire suppression equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for building piping.

Do not hang any fire suppression system item directly from a metal deck or run piping so it rests on the bottom chord of any truss or joist.

Fasteners depending on soft lead for holding power or requiring explosive powder actuation will not be accepted.

Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.

SHOP DRAWINGS
Schedule all hanger and support devices indicating attachment method and type of device for each pipe size and type of service. Provide details on the working drawings submitted for approval with all pertinent information listed.

DESIGN CRITERIA
Materials and application of pipe hangers and supports shall be in accordance to MSS SP-58 Pipe Hangers and Supports – Materials, Design, Manufacture, Selection, Application and Installation unless noted otherwise.

Materials and application of pipe hangers and supports shall be in accordance to NFPA rulings and be UL/FM listed and approved.

Piping connected to pumps, compressors, or other rotating or reciprocating equipment is to have vibration isolation supports for a distance of one hundred pipe diameters or three supports away from the equipment, whichever is greater. Standard pipe hangers/supports as specified in this section are required beyond the 100 pipe diameter/3 support distance.

PART 2 - PRODUCTS

MANUFACTURERS
B-Line, Anvil, Erico, Tolco, Afcon, Roof Products & Systems or approved equal.

STRUCTURAL SUPPORTS
Provide all supporting steel required for the installation of mechanical equipment and materials, including angles, channels, beams, etc. to suspended or floor supported tanks and equipment. All of this steel may not be specifically indicated on the drawings.

PIPE HANGERS AND SUPPORTS
HANGERS FOR PIPE SIZES 1/2" THROUGH 4":
Carbon steel, adjustable swivel ring with 3/8" min. UL/FM approved hanger rods. B-Line B3170NF, Anvil 69 or 70 or approved equal.
Carbon steel, adjustable clevis, standard, with UL/FM approved size hanger rods. B-Line B3100, Anvil 260 or approved equal.

HANGERS FOR PIPE SIZES 4" THROUGH 8":
Carbon steel adjustable swivel ring with 1/2" min. UL/FM approved hanger rods. B-Line B3170NF, Anvil 69 or 70 or approved equal.
Carbon steel, adjustable clevis, standard with UL/FM approved size hanger rods. B-Line B3100, Anvil 260 or approved equal.

HANGERS FOR PIPE SIZES 10" and UP:
Carbon steel, adjustable clevis, standard with UL/FM approved size hanger rods. B-Line B3100, Anvil 260 or approved equal.

MULTIPLE OR TRAPEZE HANGERS:
Manufactured steel channel system with manufacturers slotted interlocking pipe clamps with screw/nut securing and threaded hanger rods or steel channels with welded spacers and threaded hanger rods.

WALL SUPPORT:
Carbon steel welded bracket with hanger. B-Line 3060 Series, Anvil 190 Series or approved equal.

Steel channels with pipe clamps.

VERTICAL SUPPORT:
Carbon steel riser clamp. B-Line B3373, Anvil 261 or approved equal for above floor use.

FLOOR SUPPORT:
Carbon steel pipe saddle, stand and bolted floor flange. B-Line B3088T/B3093 or approved equal.

PIPE HANGER RODS
STEEL HANGER RODS:
Threaded both ends, threaded one end, or continuous threaded, complete with adjusting and lock nuts.

Size rods for individual hangers and trapeze support as indicated in the following schedule.

Pipe Size	**Diam. Of Rod**
Up to and Including 4"	3/8" or 9.5 mm min.

BEAM CLAMPS
MSS SP-58 Types 19 & 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick with a retaining ring and threaded rod of 3/8, 1/2, and 5/8 inch diameter. Furnish with a hardened steel cup point set screw. B-Line B3036L/B3034, Anvil 86/92 or approved equal.

MSS SP-58 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1-1/2 inch diameter. B-Line B3054, Anvil 228 or approved equal.

CONCRETE INSERTS
POURED IN PLACE:
MSS SP-58 Type 18 wedge type to be constructed of a black carbon steel body with a removable malleable iron nut that accepts threaded rod to 7/8 inch diameter. Wedge design to allow the insert to be held by concrete in compression to maximize the load carrying capacity. B-Line B2505, Anvil 281 or approved equal.

MSS SP-58 Type 18 universal type to be constructed of black malleable iron body with a removable malleable iron nut that accepts threaded rod to 7/8 inch diameter. B-Line B3014N, Anvil 282 or approved equal.

DRILLED FASTENERS:
CONCRETE CONSTRUCTION
Carbon steel expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Hilti, Rawl, Redhead or equal.

WOOD CONSTRUCTION
Side or bottom mount lag thread by rod thread one piece hanger attachment installed per the Manufacturers standard and carrying capacity limit. Powers Fastener Vertigo, Erico Hangermate or equal.

CONTINUOUS CONCRETE INSERT CHANNELS
Steel inserts with an industry standard pre-galvanized finish, nominally 1-5/8 inch by 1-3/8 inch deep by length to suit the application, designed to be nailed to concrete forms and provide a linear slot for attaching other support devices. Installed channels to provide a load rating of 2000 pounds per foot in concrete. Manufacturer's standard brackets, inserts, and accessories designed to be used with channel inserts may be used. Select insert length to accommodate all pipe sizes in the area.

ANCHORS
Use welding steel shapes, plates, and bars to secure piping to the structure.

EQUIPMENT STANDS
Use structural steel members welded to and supported by pipe supports. Clean, prime and coat with three coat rust inhibiting alkyd paint or one coat epoxy mastic. Where exposed to weather, treat with corrosive atmosphere coatings.

CORROSIVE ATMOSPHERE COATINGS
Factory coat supports and anchors used in corrosive atmospheres with hot dip galvanizing after fabrication, ASTM A123, 1.5 ounces/square foot of surface each side. Mechanical galvanize threaded products, ASTM B695 Class 50, 2.0 mil coating. Field cuts and damaged finishes to be field covered with zinc rich paint of comparable thickness to factory coating.

Corrosive atmospheres include the following locations:

- Exterior locations
- Parking Ramps
- Swimming pool equipment rooms
- Chemical storage and hazardous waste storage rooms
- Sanitary pumping stations
- Food service/kitchen areas
- Walk-in coolers/freezers
- Locker rooms
- Greenhouses

PART 3 - EXECUTION

INSTALLATION

Size, apply and install supports and anchors in compliance with manufacturers recommendations.

Install supports to provide for free expansion of the piping system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.

Coordinate hanger and support installation to properly group piping of all trades.

Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes or continuous insert channels for the supporting steel. Where continuous insert channels are used, pipe supporting devices made specifically for use with the channels may be substituted for the specified supporting devices provided that similar types are used and all data is submitted for prior approval.

Perform welding in accordance to standards of the American Welding Society.

HANGER AND SUPPORT SPACING

Use hangers with minimum vertical adjustment.

Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

Support riser piping independently of connected horizontal piping.

Adjust hangers to obtain the slope specified in the piping section of these specifications.

Space hangers for pipe as follows:

Pipe Material	Pipe Size	Max. Horiz. Spacing	Max. Vert. Spacing
Copper	3/4" through 1"	8'-0"	10'-0"
Copper	1-1/4" through 1-1/2"	10'-0"	10'-0"
Copper	2" through 3"	12'-0"	10'-0"
Copper	3-1/2" through 8"	15'-0"	10'-0"
Steel	1" through 1-1/4"	12'-0"	15'-0"
Steel	1-1/2" through 8"	15'-0"	15'-0"
Steel	8" through 12"	15'-0"	20'-0"
CPVC	1” through 1-1/4”	6’-0”	10’-0”
CPVC	1-1/2”	7’-0”	10’-0”
CPVC	2”	8’-0”	10’-0”
CPVC	2-1/2”	9’-0”	10’-0”
CPVC	3”	10’-0”	10’-0”

Hangers, supports and hanger spacing for CPVC plastic piping systems shall conform to the requirements of NFPA 13 and the manufacturer's requirements. Contractor shall provide details on the installation drawings for all proposed means of support.
Restraint hangers shall be installed at all sprinkler head location within 1'-0" for a single restraint and within 5'-0" for two points of restraint. The requirements for hanger restraint for systems in excess of 100 PSI pressure shall be followed.

Hangers for CPVC systems shall not compress, distort, cut or abrade the piping and shall allow free movement of the pipe to permit thermal expansion and contraction.

Unsupported length from the last hanger and an end sprinkler for steel piping systems shall be as follows:

1" piping:	Not greater than 36"
1-1/4" piping:	Not greater than 48"
1-1/2" piping or larger:	Not greater than 60"

RISER CLAMPS
Support vertical piping with clamps secured to the piping and resting on the building structure or secured to the building structure below at each floor. Use method of securing the vertical risers to the building structure below in stairwell locations.

ANCHORS
Install where indicated on the drawings and details. Where not specifically indicated, install anchors at ends of principal pipe runs and at intermediate points in pipe runs. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

END OF SECTION 210529

SECTION 211000 – WATER-BASED FIRE SUPPRESSION SYSTEMS

PART 1 - GENERAL

SCOPE

This section contains specifications for fire suppression pipe and pipe fittings for this project. Included are the following topics:

- Fire suppression Piping
- Unions and Flanges
- Mechanical Grooved Pipe Connections
- Sprinkler Heads
- Threaded Pipe Joints
- Mechanical Grooved Pipe Connections
- Mechanically Formed Tee Fittings
- Unions and Flanges
- Piping System Leak Tests
- Construction Verification Items

RELATED WORK

Section 210500 – Common Work Results for Fire Suppression
Section 210529 – Hangers and Supports for Fire Suppression Piping and Equipment

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

ANSI A21.4
ANSI A21.11
ANSI A21.51

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings
ANSI B16.3	Malleable and Ductile Iron Threaded Fittings
ANSI B16.4	Cast Iron Threaded Fittings
ANSI B16.5	Pipe Flanges and Flanged Fittings
ANSI B16.9	Factory Made Wrought Steel Buttweld Fittings
ANSI B16.11	Forged Steel Fittings, Socket Welded and Threaded
ANSI B16.18	Cast Bronze Solder Joint Pressure Fittings
ANSI B16.22	Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings
ANSI B16.29	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
ASTM A105	Forgings, Carbon Steel, for Piping Components
ASTM A126	Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A135	Electric Resistance Welded Steel Pipe
ASTM A181	Forgings, Carbon Steel for General Purpose Piping

ASTM A234	Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
ASTM A536	Ductile Iron Castings
ASTM A795	Black and Hot Dipped Zinc Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
ASTM B88	Seamless Copper Water Tube
AWS A5.8	Brazing Filler Metal
AWS D10.9	Qualification of Welding Procedures and Welders for Piping and Tubing, Level AR3
NFPA 13	Installation of Sprinkler Systems. (Latest prevailing edition)
NFPA 14	Installation of Standpipe and Hose Systems. (Latest prevailing edition)
UL	Underwriters' Laboratories Listing
FM	Factory Mutual Approval

SHOP DRAWINGS
Schedule from the contractor indicating the ANSI/ASTM specification number of the pipe being proposed along with its type and grade, if known at the time of submittal, and sufficient information to indicate the type and rating of fittings for each service.

QUALITY ASSURANCE
Substitution of Materials: Refer to Section 012500 Substitution Procedures.

Order all copper and steel pipe with each length marked with the name or trademark of the manufacturer and type of pipe; with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier.

Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the Owner.

DESIGN CRITERIA
Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM specifications as listed in this specification.

Construct all piping systems for the highest pressures and temperatures in the respective system but not less than 175 psig.

Where weld fittings or mechanical grooved fittings are used, use only long radius elbows having a centerline radius of 1.5 pipe diameters.

Where ASTM A53 or A795 type F pipe is specified, grade A type E or S, or grade B type E or S may be substituted at Contractor's option. Where ASTM A135 grade A pipe is specified, grade B pipe may be substituted at Contractor's option. Where the grade or type is not specified, Contractor may choose from those commercially available.

Where ASTM B88, type L H (drawn) temper copper tubing is specified, ASTM B88, type K H (drawn) temper copper tubing may be substituted at Contractor's option.

PART 2 - PRODUCTS

FIRE SUPPRESSION PIPING

STEEL PIPE:

Black steel pipe welded and seamless, Type F, Grade A, ASTM A53; black welded and seamless steel pipe for fire protection use, Type F, ASTM A795; electric resistance welded steel pipe, Grade A, ASTM A135.

Threaded lightwall pipe and plastic pipe are not acceptable.

Pipe Wall Thickness: Schedule 40 for welded, rolled groove, cut groove and threaded. Schedule 30 for welded, rolled groove, 8" and larger cut groove and 8" and larger threaded piping. Schedule 10 up to and including 6" for rolled groove and welded. 0.188" for 8" and 10" rolled groove and welded.

Fittings: 2" and Under - Cast iron threaded fittings, Class 125 or 250, ASTM A126/ANSI B16.4. Malleable and ductile iron threaded fittings, Class 150 or 300, ASTM A197/ANSI B16.3. Standard weight seamless carbon steel weld fittings, ASTM A234 grade, ANSI B16.9. Mechanical grooved fittings with EPDM gaskets, ASTM A536 ductile iron, ASTM A47 malleable iron or ASTM A53 fabricated steel.

Welding Materials: Comply with Section II, Part C, ASME Boiler and Pressure Vessel Code for welding materials.

Finish: Hot dipped zinc coated (galvanized) finish on piping and fittings shall be used in dry sprinkler or combined pipe systems, pre-action systems, piping exposed to weather and piping exposed to corrosive environments where indicated. Thread or cut groove hot dipped zinc coated pipe ends for fitting connections. Indoor dry standpipe systems supplied by a Fire Dept. connection only may be black steel piping and fittings.

COPPER PIPE:

Type L copper water tube, H (drawn) temper, ASTM B88; with cast copper pressure fittings, ANSI B16.18; wrought copper pressure fittings, ANSI B16.22; copper phosphorous brazing alloy, AWS A5.8 BCuP. Mechanically formed brazed tee connections may be used in lieu of specified tee fittings for branch takeoffs up to one-half (1/2) the diameter of the main.

UNIONS AND FLANGES

2" AND SMALLER STEEL:

ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron on black steel piping and galvanized malleable iron on galvanized steel piping.

2" AND SMALLER COPPER:

ANSI B16.18 cast bronze union coupling or ANSI B15.24 Class 150 cast bronze flanges.

2-1/2" AND LARGER:
ASTM A181 or A105, Class 150, grade 1 hot forged steel flanges of threaded, welding neck, or slip-on pattern on black steel and threaded only on galvanized steel. ANSI B16.1 or ANSI B16.5, Class 150 cast iron threaded flanges. Use raised face flanges ANSI B16.5 for mating with other raised face flanges or equipment with flat ring or full face gaskets. Use ANSI B16.1 flat face flanges with full face gaskets for mating with other flat face flanges on equipment.

2-1/2" AND LARGER COPPER:
ANSI B16.24, Class 150 cast bronze flanges with raised face.

MECHANICAL GROOVED PIPE CONNECTIONS
Mechanical grooved pipe couplings and fittings, ASTM F1476, as manufactured by Victaulic, Anvil, Grinnell or Shurjoint may be used with steel pipe. Mechanical grooved components and assemblies to be rated for minimum 175 psi working pressure unless noted otherwise.

All mechanical grooved pipe material including gaskets, couplings, fittings and flange adapters to be from the same manufacturer.

Couplings and fittings to be malleable iron, ASTM A47, or ductile iron A536 with painted finish. Fittings used on galvanized steel pipe to have galvanized finish, ASTM A153.

Gaskets to be EPDM, ASTM D2000. Gaskets for dry systems to be flush seal design. Heat treated carbon steel oval neck track bolts and nuts, ASTM A-183, with zinc electroplated finish.

Flange adapters to be ductile iron, ASTM A536; except at lug type butterfly valves where standard threaded flanges shall be used.

Credit for the inherent flexibility of mechanical grooved pipe connections when used for expansion joints or flexible connectors may be allowed upon specific application by the Contractor. Three flexible couplings at first three connection points both upstream and downstream of pumps may be used in lieu of flexible connectors. Request for expansion joints shall be made in writing and shall include service, location, line size, proposed application and supporting calculations for the intended service.

SPRINKLER HEADS
Manufacturer: Sprinkler head model numbers establish type and style of head. Products of the following manufacturers determined to be equal by the Architect/Engineer will be accepted: Tyco, Reliable, Victaulic and Viking.

Fusible link or glass bulb type, cast brass or bronze construction. Provide heads with nominal 1/2" discharge orifice except where greater than normal density requires large orifice.

Select fusible link or glass bulb temperature rating to not exceed maximum ambient temperature rating allowed under normal conditions at installed location. Provide ordinary temperature (165 degree) fusible link or glass bulb type except at skylights, sealed display windows, unventilated attics and roof spaces, over cooking equipment, adjacent to diffusers, unit heaters, uninsulated heating pipes or ducts, mechanical rooms, storage rooms, or where otherwise indicated.

Provide quantity of spare heads as noted below and 1 wrench for each type of head and each temperature range installed. Provide 6 spare heads per 300 or less installed heads, 12 per 1000 or less and 24 for more than 1000. Provide steel cabinet for storage of heads and wrenches.

Quick Response Upright: Viking Microfast M (QR) or approved equal, brass finish.

Quick Response Vertical Sidewall: Viking Microfast M or approved equal, chrome finish.

Quick Response Pendant: Viking Microfast M or approved equal, chrome plated finish and escutcheon.

Quick Response Sidewall: Viking Microfast M or approved equal, chrome plated finish and escutcheon.

Dry Pendant (Self-contained type): Viking Model C or approved equal, brass finish with brass escutcheon.

Dry Pendant (Self-contained type): Viking Model M (Quick Response) or approved equal, adjustable, recessed, with chromed escutcheon.

Dry Horizontal Sidewall (Self-contained type): Viking Model M (Quick response) or approved equal, adjustable, recessed, with chromed escutcheon.

Pendant Security: Tyco Raven or approved equal, with sleeve, centering grommet and retainer flange.

Horizontal Sidewall Security: Tyco Raven or approved equal, with sleeve, centering grommet and retainer flange.

PART 3 - EXECUTION

GENERAL

Install pipe and fittings in accordance to reference standards, manufacturers recommendations and recognized industry practices.

PREPARATION
Cut pipe ends square. Ream ends of piping to remove burrs. Clean scale and dirt from interior and exterior of each section of pipe and fitting prior to assembly.

ERECTION
Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of fire protection piping with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, ceiling grid layout, light fixtures and grilles before installing piping.

Where copper or steel piping is embedded in masonry or concrete, provide protective sleeve covering of elastomeric pipe insulation.

Provide 3/32" min. thickness steel nailing plates behind or on either side of piping where the possibility of penetration from nails or drywall screws exists.

Maintain piping in clean condition internally during construction.

Provide clearance for access to valves and piping specialties.

Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.

Install piping so that system can be drained. Where possible, slope to main drain valve. Slope dry pipe and pre-action systems subject to freezing at minimum 1/4"/10' on mains and 1/2"/10' on branches. Where piping not susceptible to freezing cannot be fully drained, install nipple and cap for drainage of less than 5 gallons or ball valve with hose thread outlet and cap for drainage over 5 gallons. Pipe main drain valve to grade or to air gap sewer receptor.

Mitered ells, notched tees, and orange peel reducers are not acceptable. On threaded piping, bushings are not acceptable.

Do not route piping within exterior walls.

Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment.

Install all valves and piping specialties, including items furnished by others, as specified and/or detailed. Provide access to valves and specialties for maintenance. Make connections to all equipment, fixtures and systems installed by others where same requires the piping services indicated in this section.

THREADED PIPE JOINTS
Use a thread lubricant or teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

MECHANICAL GROOVED PIPE CONNECTIONS
Use pipe factory grooved in accordance to the coupling manufacturer's specifications or field grooved pipe in accordance to the same specifications using specially designed tools available for the application. Lubricate pipe and coupling gasket, align pipe, and secure joint in accordance to the coupling manufacturer's specifications.

MECHANICALLY FORMED TEE FITTINGS
Form mechanically extracted collars in a continuous operation, consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the tube wall. Use an adjustable collaring device. Notch and dimple the branch tube. Braze the joint with neutral flame oxy-acetylene torch, applying heat properly so that pipe and tee do not distort; remove distorted connections.

UNIONS AND FLANGES
Install a union, flange or grooved coupling combination at each connection to each piece of equipment and at other items which may require removal for maintenance, repair, or replacement. Where a valve is located at a piece of equipment, locate the flange or union or grooved coupling combination connections on the equipment side of the valve. Concealed unions, flanges or couplings are not acceptable.

PIPING SYSTEM LEAK TESTS
Conduct pressure test with test medium of water. If leaks are found, repair the area with new materials and repeat the test; caulking will not be acceptable.

Test piping in sections or entire system as required by sequence of construction. Do not conceal pipe until it has been successfully tested. If required for the additional pressure load under test, provide temporary restraints at fittings or expansion joints. Entire test must be witnessed by the Division's representative.

Use clean water and remove air from the piping being tested where possible. Measure and record test pressure at the high point in the system.

Test system at 200 psi for 2 hours showing no leakage. Where system design is in excess of 150 psig, test at a pressure 50 psig above system design pressure.

All pressure tests are to be documented on NFPA Contractor's Material and Test Certificate forms.

INSTALLATION
Install fire protection system components in accordance to NFPA rulings, listings and manufacturers recommendations. Locate where accessible for servicing and replacement.

Sprinkler Heads: Locate sprinkler heads as indicated on fire protection plan and reflected ceiling plan maintaining minimum clearances from obstructions, ceilings and walls. Install sprinkler heads level in locations not subject to spray pattern interference. Provide fire sprinkler head installations below ductwork, soffits, etc.

END OF SECTION 211000

DIVISION 22 – PLUMBING

SECTION 220500 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

SCOPE
This section includes information common to two or more technical plumbing specification sections or items that are of a general nature, not conveniently fitting into other technical sections.

REFERENCE
Applicable provisions of Division 1 govern work under this section.

This section applies to all Division 22 00 00 sections of plumbing.

STANDARDS
Abbreviations of standards organizations referenced in this and other sections are as follows:

ABMA	American Boiler Manufacturers Association
ACPA	American Concrete Pipe Association
AGA	American Gas Association
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASME	American Society of Mechanical Engineers
ASPE	American society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
AWS	American Welding Society
CISPI	Cast Iron Soil Pipe Institute
CGA	Compressed Gas Association
CS	Commercial Standards, Products Standards Sections, Office of Eng. Standards Service, NBS
EPA	Environmental Protection Agency
FS	Federal Specifications, Superintendent of Documents, U.S. Government Printing Office
GAMA	Gas Appliance Manufacturers Association
IAPMO	International Association of Plumbing & Mechanical Officials
IEEE	Institute of Electrical and Electronics Engineers
ISA	Instrument Society of America
MCA	Mechanical Contractors Association
MICA	Midwest Insulation Contractors Association
MSS	Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.

NBS	National Bureau of Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NSF	National Sanitation Foundation
PDI	Plumbing and Drainage Institute
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association. Inc.
STI	Steel Tank Institute
UL	Underwriters Laboratories Inc.

Standards referenced in this section:

ACI 614	Recommended Practice for Measuring, Mixing and Placing of Concrete
ASTM D1557	Standard Test Method for Moisture-Density Relations of Soils
ASTM E814	Standard Test Method for Fire Tests of Through-Penetration Fire Stops
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
D.O.T.	Standard Specifications for Road and Bridge Construction, State of Wisconsin, Dept. of Transportation
UL1479	Fire Tests of Through-Penetration Firestops
UL723	Surface Burning Characteristics of Building Materials

QUALITY ASSURANCE

Substitution of Materials: Refer to Section 012500 Substitution Procedures.

All products and materials used are to be new, undamaged, clean and in good condition. Existing products and materials are not to be reused unless specifically indicated.

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and for obtaining the intended performance from the system into which these items are placed.

CONTINUITY OF EXISTING SERVICES

Do not interrupt or change existing services without prior written approval from the Owner's Project Representative. When interruption is required, coordinate scheduling of down-time with the Owner to minimize disruption to his activities. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.

SEALING AND FIRESTOPPING

Sealing and firestopping of sleeves/openings between piping, etc. and the sleeve or structural opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and fireproofing. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation.

CODES
Comply with requirements of Wisconsin Administrative Code.

REQUEST AND CERTIFICATION FOR PAYMENT
Within 10 days after Notice to Proceed, the successful bidder will submit to the WisDOT Project Representative in a form prescribed below and by the Section 013200 Construction Progress Documentation, Reports, Records and Data, Payments to Contractor, a cost breakdown of the proposed values for work performed which, if approved by WisDOT, will become the basis for construction progress and monthly payments. The cost breakdown items shall reflect actual work progress stages as closely as feasible.

In addition, if payment is requested for approved off-site stored material, then that material shall be listed as a line item in the request and certification for payment cost breakdown.

CERTIFICATES AND INSPECTIONS
Refer also to Section 010000 General Requirements.

Obtain and pay for all required State installation inspections except those provided by the Architect/Engineer. Deliver the originals of inspection certificates and test records to the Owner's Project Representative. Include copies of the certificates and test records in the Operating and Maintenance Instructions.

SUBMITTALS
Refer to Section 013300 Submittals.

Not more than two weeks after award of contract but before any shop drawings are submitted, contractor to submit the following plumbing system data sheet. List piping material type for each piping service on the project, ASTM number, schedule or pressure class, joint type, manufacturer and model number where appropriate. List valves and specialties for each piping service, fixture and equipment with manufacturer and model number. The approved plumbing system data sheet(s) will be made available to the WisDOT Project Representative for their use on this project.

PLUMBING SYSTEM DATA SHEET

Item	**Pipe Service/Sizes**	**Manufacturer/Model No.**	**Remarks**
Pipe			
Fittings			
Unions			
Valves:			
Ball			
Balancing			
Check			
Other			

Hangers & Supports
Insulation
Plbg. Specialties:
    Floor/Roof Drains
    Cleanouts
    Water Hammer Arrestors
    Backflow Preventers
    Plbg. Fixtures
Plbg. Equipment

Shop drawing submittals are to be bound, labeled, contain the project manual cover page and a material index list page showing item designation, manufacturer and additional items supplied with the installation. Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Include wiring diagrams of electrically powered equipment.

Submit sufficient quantities of data sheets and shop drawings to allow the following distribution:

- Operating and Maintenance Manuals: 2 copies
- WisDOT: 1 copy
- Architect/Engineer: 1 copy

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

In addition to the general content specified under GENERAL REQUIREMENTS supply the following additional documentation:

1. Records of tests performed to certify compliance with system requirements.
2. Manufacturer's wiring diagrams for electrically powered equipment.
3. Certificates of inspection by regulatory agencies.
4. Valve schedules.
5. Lubrication instructions, including list/frequency of lubrication.
6. Parts lists for fixtures, equipment, valves and specialties.
7. Manufacturers installation, operation and maintenance recommendations for fixtures, equipment, valves and specialties.
8. Additional information as indicated in the technical specification sections.

RECORD DRAWINGS
Refer to Section 017839 Project Record Documents.

PART 2 - PRODUCTS

ACCESS PANELS AND DOORS

LAY-IN CEILINGS:

Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration provided under Section 09500 are sufficient; no additional access provisions are required unless specifically indicated.

PLASTER WALLS AND CEILINGS:

16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers, and similar wet areas, concealed hinges, screwdriver operated cam latch for general applications, key lock for use in public or secured areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the item needing service; minimum size is 12" by 12".

IDENTIFICATION

SNAP-AROUND PIPE MARKERS:

One-piece, preformed, vinyl construction, snap-around or strap-around pipe markers with applicable labeling and flow direction arrows, ¾" min. size for lettering. Provide nylon ties on each end of pipe markers. Equal to Seton Setmark.

UNDERGROUND TRACER WIRE:

All underground non-metallic sewers/mains and water services/mains shall be provided with tracer wire installations. Tracer wire installations shall conform with Section 182.0715(2r) of Wisconsin Statutes and prevailing Department of Safety and Professional Services Chapter 384 requirements. Tracer wire shall be continuous solid copper or steel plastic coated with split bolt or compression-type connectors.

BEDDING AND BACKFILL

Bedding up to a point 12" inches above the top of the pipe shall be thoroughly compacted sand or crushed stone chips meeting the following gradations:

Gradation for Bedding Sand		Gradation for Crushed Stone Chip Bedding	
Sieve Size	% Passing (by Wt)	Sieve Size	% Passing (by Wt)
1 inch	100	1/2 inch	100
No. 16	45 - 80	No. 4	75 - 100
No. 200	2 - 10	No. 100	10 - 25

Backfill above the bedding in lawn areas shall be thoroughly compacted excavated material free of large stones, organic, perishable, and frozen materials.

Backfill above the bedding under existing and future utilities, paving, sidewalks, curbs, roads and buildings shall be granular materials, pit run sand, gravel, or crushed stone, free from large stones, organic, perishable, and frozen materials.

SEALING AND FIRESTOPPING
FIRE AND/OR SMOKE RATED PENETRATIONS:

Manufacturers: 3M, Hilti, Rectorseal, STI/SpecSeal, Tremco, or approved equal.

All firestopping systems shall be provided by the same manufacturer.

Fire stop systems shall be UL listed or tested by an independent testing laboratory approved by the Department of Commerce.

Submittals: Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgment can be based upon.

Use a product that has a rating not less than the rating of the wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.

Use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop blocks, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

NON-RATED PENETRATIONS:

In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated pipe and the cored opening or a water-stop type wall sleeve. The operating bolts of the mechanical type seal shall be accessible from the interior of the building.

At pipe penetrations of non-rated interior partitions, floors and exterior walls, use urethane caulk in annular space between pipe insulation and sleeve. For non-rated drywall, plaster or wood partitions where sleeve is not required use urethane caulk in annular space between pipe insulation and wall material

PART 3 - EXECUTION

DEMOLITION

Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the Owner to minimize disruption to the existing building occupants.

All pipe, fixtures, equipment, wiring and associated conduit, insulation and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor except as specifically noted otherwise. All designated equipment is to be turned over to the user agency for their use at a place and time so designated. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.

EXCAVATION AND BACKFILL

Perform all excavation and backfill work necessary to accomplish indicated plumbing systems installation. Excavate to bottom of pipe and structure bedding, 4" in stable soils, 6" in rock or wet trenches and 8" in unstable soil. Finish bottoms of excavations to true, level surface.

Tunnel or remove sidewalk and curb in areas of excavation to the nearest joint. Remove pavements, curbs and gutters to neat and straight lines to the limits of removal. Make sawcut lines parallel to existing joints, or parallel or perpendicular to pavement edges to form a neat patch. Carefully remove remaining pavement within the sawcut area. Leave existing base materials between the area disturbed by the work and the sawcut line undisturbed by the sawcutting, pavement removal, or pavement replacement processes.

Strip topsoil from area to be excavated, free from subsoil and debris, and store for later respreading.

At no time place excavated materials where they will impede surface drainage unless such drainage is being safely rerouted away from the excavation.

Excavate whatever materials are encountered as required to place at the elevations shown, all pipe, manholes, and other work. Remove debris and rubbish from excavations before placing bedding and backfill material.

Remove surplus excavated materials from site.

Verify the locations of any water, drainage, gas, sewer, electric, telephone or steam lines which may be encountered in the excavation. Underpin and support all lines. Cut off service connections encountered which are to be removed at the limits of the excavation and cap.

Provide and maintain all fencing, barricades, signs, warning lights, and/or other equipment necessary to keep all excavation pits and trenches and the entire subgrade area safe under all circumstances and at all times. No excavation shall be left unattended without adequate protection.

Elevations shown on the plans are subject to such revisions as may be necessary to fit field conditions. No adjustment in compensation will be made for adjustments up to two (2) feet above or below the grades indicated on the plans.

Install lines passing under foundations with minimum of 1-1/2 inch clearance to concrete and insure there is no disturbance of bearing soil.

Bed pipe up to a point 12" above the top of the pipe. Take care during bedding, compaction and backfill not to disturb or damage piping.

Mechanically compact bedding and backfill to prevent settlement. The initial compacted lift to not exceed 24" compacted to 95% density per Modified Proctor Test (ASTM D-1557). Subsequent lifts under pavements, curbs, walks and structures are not to exceed 12" and be compacted to 95% density per Modified Proctor Test. In all other areas where construction above the excavation is not anticipated within 2 years, mechanically compact backfill in lifts not exceeding 24" to 90% density per Modified Proctor Test. Route the equipment over each lift of the material so that the compaction equipment contacts all areas of the surface of the lift.

CONCRETE WORK

Cast-in-place concrete within the building will be performed by the Division 3 Contractor unless otherwise noted. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for support or installation of plumbing piping, fixtures, specialties and equipment. Coordinate locations of equipment, pipe penetrations in wet areas, etc. with the Division 3 Contractor.

Plumbing related cast-in-place concrete on the exterior of the building to be provided by this Contractor in conformance with requirements of Division 3. This includes piping thrust restraints, pipe supports, hydrant supports, manholes, catch basins, grease traps, septic tanks, distribution boxes, valve pits, meter pits, cleanout cover pads, yard hydrant pads, etc.

CUTTING AND PATCHING

Refer to Division 1, General Requirements, Cutting and Patching.

BUILDING ACCESS

Arrange for the necessary openings in the building to allow for admittance or removal of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

EQUIPMENT ACCESS
Install all piping, conduit and accessories to permit access to equipment for maintenance and service. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Access doors in general construction are to be furnished by the Plumbing Contractor and installed by the General Contractor.

COORDINATION
Coordinate all work with other contractors prior to installation. Any work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

Verify that all devices are compatible for the type of construction and surfaces on which they will be used.

IDENTIFICATION
Identify equipment in mechanical equipment rooms by stenciling equipment number and service with one coat of black enamel against a light background or white enamel against a dark background. Use a primer where necessary for proper paint adhesion.

Where stenciling is not appropriate for equipment identification, engraved name plates may be used.

Identify interior piping not less than once every 30 feet, not less than once in each room, adjacent to each access door or panel, and on both side of the partition where accessible piping passes through walls or floors. Place flow directional arrows at each pipe identification location. Use one coat of black enamel against a light background or white enamel against a dark background.

Identify all exterior buried piping for entire length with underground warning tape except for sewer piping which is routed in straight lines between manholes or cleanouts. Place tape 6"-12" below finished grade along entire length of pipe. Extend tape to surface at building entrances, meters, hydrants and valves. Where existing underground warning tape is broken during excavation, replace with new tape identifying appropriate service and securely spliced to ends of existing tape.

SLEEVES
Provide galvanized sheet metal sleeves for pipe penetrations through interior and exterior walls to provide a backing for sealant or firestopping. Patch wall around sleeve to match adjacent wall construction and finish. Grout area around sleeve in masonry construction. In finished spaces where pipe penetration through wall is exposed to view, sheet metal sleeve shall be installed flush with face of wall. In existing poured concrete walls where penetration is core drilled, pipe sleeve is not required.

Pipe sleeves are not required in interior non-rated drywall, plaster or wood partitions and sleeves are not required in existing poured concrete walls where penetrations are core drilled.

Pipe sleeves in new poured concrete construction shall be schedule 40 steel pipe (sized to allow insulated pipe to run through sleeve), cast in place.

In all piping floor penetrations, fire rated and non-fire rated, top of sleeve shall extend 1 inch above the adjacent finished floor. In existing floor penetrations, core drill sleeve opening large enough to insert schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. If the pipe penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the sleeve that will transfer weight to existing floor structure.

Pipe sleeves are not required in cored floor pipe penetrations through existing floors that are not located in mechanical rooms, food service areas or wet locations listed above.

SEALING AND FIRESTOPPING

FIRE AND/OR SMOKE RATED PENETRATIONS:

Install approved product in accordance to the manufacturer's instructions where a pipe penetrates a fire/smoke rated surface. When pipe is insulated, use a product which maintains the integrity of the insulation and vapor barrier.

Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support substantial weight.

END OF SECTION 220500

SECTION 220514 – PLUMBING SPECIALTIES

PART 1 - GENERAL

SCOPE
This section includes specifications for floor drains, roof drains, cleanouts, backflow preventers, water hammer arrestors and other miscellaneous plumbing specialties.

RELATED DOCUMENTS
Section 221100 - Facility Water Distribution Section 221300 - Facility Sanitary Sewerage Section 220523 - General-Duty Valves for Plumbing Piping

REFERENCE
Applicable provisions of Division 1 shall govern work under this section.

REFERENCE STANDARDS
ANSI A112.21.1 - Floor Drains.
ANSI A112.26.1/PDI WH-201 Water Hammer Arrestors.
ASSE 1010 - Water Hammer Arrestors.

QUALITY ASSURANCE
Substitution of Materials: Refer to Section 012500 Substitution Procedures.

Plumbing products requiring approval by the State of Wisconsin Dept. of Safety and Professional Services must be approved or have pending approval at the time of shop drawing submission.

SHOP DRAWINGS
Include data concerning dimensions, capacities, materials of construction, ratings, certifications, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.
PART 2 - PRODUCTS

FLOOR DRAINS
Manufacturer: Josam, Smith, Wade, Watts, Zurn.

FD 1: 3" min. (2” min. for single shower drains) enameled cast iron two piece body with double drainage flange, weep holes, reversible clamping adjustable collar, adjustable 6"x6" min. square or round polished nickel bronze strainer with threaded collar, bottom outlet. Zurn ZN-415-S or B.

HUB DRAINS
Manufacturer: Josam, Smith, Wade, Watts, Zurn.

HD-1: 3“ min. cast iron hub section up 2” min. above floor level, with full-sized P-trap.

HD-2: 3” min. enameled cast iron bottom outlet floor drain body with membrane clamp, adjustable collar and 3” high extension adapter (less threads on inlet). Zurn Z-415-U (modified). (For use on above grade installations.) .

CLEANOUTS
Manufacturer: Josam, Smith, Wade, Watts, Zurn.

INTERIOR CONCRETE FLOOR AREAS: Enameled cast iron body with round or square adjustable scoriated polished nickel bronze cover, tapered threaded ABS closure plug. Zurn ZN-1400- / ZN-1400-T.

INTERIOR CERAMIC TILE FLOOR AREAS: Enameled cast iron body with square adjustable scoriated nickel bronze cover, tapered threaded ABS closure plug. Zurn ZN-1400-T.

INTERIOR CARPETED FLOOR AREAS: Enameled cast iron body with round adjustable scoriated nickel bronze cover and secured carpet marker, tapered threaded ABS closure plug. Zurn Z-1400-CM.

INTERIOR FINISHED WALL AREAS: Line type cleanout tee with tapered threaded ABS cleanout plug, round polished stainless steel access cover secured with machine screw. Zurn Z-1446- (Note: Screw shall not pass completely through the ABS plug, trim screw as necessary).

INTERIOR EXPOSED VERTICAL STACKS: Line type cleanout tee with tapered threaded ABS closure plug. Zurn Z-1445.

INTERIOR HORIZONTAL LINES: Cast iron hub with tapped ferrule and tapered threaded ABS or PVC closure plug, or no-hub coupling and blind plug.

WATER HAMMER ARRESTORS
Manufacturer: PPP Industries, Sioux Chief, Wade, Watts.

ANSI A112.26.1, ASSE 1010; sized in accordance to PDI WH 201, precharged piston type constructed of hard drawn Type K copper, threaded brass adapter, brass piston with o-ring seals, FDA approved silicone lubricant, suitable for operation in temperature range 35 to 150 degrees F, maximum 250 psig working pressure, 1500 psig surge pressure. Watts series 15.

SAFINGS
Manufacturers: Noble, Oatey, Mayco or approved equal.

Chlorinated polyethylene sheeting, 40 mils thick, ASTM D4068, joined with CPE solvent; or 3 lb./sq. ft. sheet lead.

VENT FLASHINGS
Manufacturers: Semco, Oatey, Mayco or approved equal.

Formed 3 lb./sq. ft. lead flashing with minimum base size of 15"x17".

Single Ply Membrane Roofs: Flashing boot of material compatible with roofing membrane with base flange for adhering to membrane and stainless steel drawband for securing to vent pipe.

PART 3 - EXECUTION

INSTALLATION
Coordinate location and setting of plumbing specialties with adjacent construction. Install in accordance to manufacturers recommendations.

Set floor drains, roof drains, trench drains and cleanouts level and plumb adjusted to finished floor elevation, roof elevation or finished wall location. Locate where serviceable. Allow minimum of 18" clearance around cleanouts for rodding. Lubricate threaded cleanout plugs with graphite and oil, teflon tape or waterproof grease. Install trap primer connections where indicated. Provide deep seal traps on floor drains and hub drains installed in mechanical rooms, penthouses or rooms with excessive positive or negative pressure.

Floor drains and hub drains installed in public restrooms, locker rooms, seldom used rooms, and areas with minute drainage flow shall have installations of combination trap evaporation/backflow preventer diaphragm installations.

Install water hammer arrestors where indicated and at quick closing valve installations.

Mount hose bibbs securely fastened to wall where indicated. Provide water hammer arrestor in line to hose bibb.

Excavate for manholes and catch basins setting precast bases on granular backfill and pouring cast in place bases on undisturbed soil. Seal joints between base, sections, collars and castings with gasketing material for tightly packed waterproof seals. Adjust casting to match finished grade. Form interior shelves with concrete grout for smooth flowlines conforming to the shape and slope of the sewer. Place piping into manholes providing full support of piping on exterior bedding and insuring pipe seals are properly installed and waterproof. Valve manholes and other manholes intended to remain dry must be made waterproof and are subject to infiltration testing. Where an entering sewer is 2 feet

or more above the springline of a leaving sewer, provide outside drop connection encased in concrete. Where existing pipe penetrations are being removed or capped, fill opening with non-shrink Portland cement grout plug. Backfill and compact soil around manhole or catch basin.

Install safing at floor drains above grade. Extend 12" beyond drains in all directions. Cover entire floor in showers and extend 6" up in walls above curbs and to a height of 6' (3" wide each direction) in corners. Install on concrete floor that is smooth and free of debris. Seal all joints and connect to drain body clamp. Safing is subject to standing water leak test. Install safing at all built-up shower installations. (Note: spray-on and brush applied liquid safing is not acceptable).

Flash vent penetrations through roof. Turn down top of lead flashing into vent pipe. Tighten drawband of membrane boot to vent pipe. Adhere base flashing to deck or membrane. Provide waterproof patch around penetration on existing roofs.

Install washing machine boxes in wall construction, secured to structure, directly behind proposed washing machine location. Provide water hammer arrestors in supply piping. Mount box a min. of 36” above floor.

END OF SECTION 220514

SECTION 220523 – GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

SCOPE
This section includes valve specifications for all Plumbing systems except where indicated under Related Work.

RELATED WORK
Section 220514 - Plumbing Specialties

REFERENCE
Applicable provisions of Division 1 govern work under this section.

QUALITY ASSURANCE
Substitution of Materials: Refer to Section 012500 Substitution Procedures.

SUBMITTALS
Schedule of all valves indicating type of service, dimensions, materials of construction, and pressure/temperature ratings for all valves to be used on the project. Temperature ratings specified are for continuous operation.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

PART 2 - PRODUCTS

WATER SYSTEM VALVES
All water system valves to be rated at not less than 125 water working pressure at 240 degrees F unless noted otherwise.

BALL VALVES:
3" and smaller: Two or three piece bronze body; sweat ends, chrome plated bronze ball; glass filled teflon seat; teflon packing and threaded packing nut; blowout-proof stem; 600 psig WOG. Provide valve stem extensions for valves installed in all piping with insulation. Apollo 70-200, Jomar T/S 100, Hammond 8511, Milwaukee BA150, Nibco S580-70, Watts B-6001.

SPRING LOADED CHECK VALVES:
2" and smaller: Bronze body, sweat or threaded ends, bronze trim, stainless steel spring, stainless steel center guide pin, Class 125, teflon seat unless only bronze available. ConBraCo 61 series, Mueller 203BP, Nibco S480Y, Val-Matic S1400 series, Watts equal.

STOP & WASTE VALVES:
1" and smaller, Bronze body, sweat or threaded ends, 400 psi WOG, stainless steel ball and stem, full port ball valve, with threaded drain cap, Watts B-6300/6301 SS series. Apollo, Jomar Hammond, Milwaukee or Nibco manufacturer.

BALANCE VALVES:
2" and smaller: Two or three piece bronze body ball valve, sweat or threaded ends, chrome plated brass ball, glass filled teflon seat, threaded packing nut, with adjustable memory stop position indicator and extended handle stem, suitable for 400 psig water working pressure at 240 degrees F. Watts B-6000/B-6001 BS Apollo, Grinnell, Hammond, Jomar, Milwaukee or Nibco manufacturer.

DRAIN VALVES:
3/4 inch ball valve with integral threaded hose adapter, sweat or threaded inlet connections, with threaded cap and chain on hose threads, Watts B-6000-CC/B-6001-CC series, Nibco, Apollo or approved equal.

BALL VALVES:
3" and smaller: Two or three piece bronze body; sweat or threaded ends, chrome plated bronze ball; glass filled teflon seat; teflon packing and threaded packing nut; blowout-proof stem; 400 psig WOG. Apollo 70-200, Hammond 8511, Milwaukee BA150, Nibco S585-70, Watts B-6001.

SWING CHECK VALVES:
1-1/2" and smaller: Bronze body, threaded ends, Y-pattern, regrindable bronze seat, renewable bronze disc, Class 125, suitable for installation in a horizontal or vertical line with flow upward. Crane 1342, Hammond IB941, Nibco S413B, Watts CVYS.

SPRING LOADED CHECK VALVES:
2" and smaller: Bronze body, sweat or threaded ends, bronze trim, stainless steel spring, stainless steel center guide pin, Class 125, teflon seat unless only bronze available. ConBraCo 61 series, Mueller 203BP, Nibco S480Y, Val-Matic S1400 series.

NATURAL GAS SYSTEMS
SHUT-OFF VALVES:
4" and smaller: Ball or eccentric plug valve, bronze or cast iron body, 2" and under threaded ends, 2-1/2" and over flanged ends, chrome plated bronze ball, bronze or nickel plated cast iron plug, TFE or Hycar seats and seals, lever handle, 175 psi W.O.G., U.L listed for use as natural gas shut-off. Apollo 80-100, DeZurik 425, Milwaukee, Nibco and Watts equals.

GAS PRESSURE REGULATORS:
2" and smaller: Cast iron body, aluminum spring and diaphragm, Nitrile diaphragm, threaded ends, 150 psi W.O.G., -20 degrees F to 150 degrees F.

PART 3 - EXECUTION

GENERAL
Properly align piping before installation of valves. Install and test valves in strict accordance with valve manufacturer's installation recommendations. Do not support weight of piping system on valve ends.

Mount valves in locations which allow access for operation, servicing and replacement.

Provide valve handle extensions for all valves installed in insulated piping.

Install all valves with the stem in the upright or horizontal position. If possible, install butterfly valves with the stem in the horizontal position. Valves installed with the stems down will not be accepted.

Prior to flushing of piping systems, place all valves in the full-open position.

SHUT-OFF VALVES
Install shut-off valves at each piece of equipment, at each branch take-off from mains for isolation or repair and elsewhere as indicated.

BALANCING VALVES
Install where indicated on the drawings and details for balancing of flow in pumped hot water recirculation piping systems.

Upon project completion, adjust each valve and set position stop. Balance system to minimum flow in return piping branches needed to maintain even supply water temperature throughout building.

DRAIN VALVES
Provide drain valves for complete drainage of all systems. Locations of drain valves include low points of piping systems, downstream of riser isolation valves, equipment locations specified or detailed, other locations required for drainage of systems and elsewhere as indicated.

SPRING LOADED CHECK VALVES
Install a spring loaded check valve in each circulating pump discharge line, each clearwater sump pump discharge line and elsewhere as indicated.

SWING CHECK VALVES
Install swing check valves in recirculation branch lines and elsewhere as indicated. Provide weighted swing check valves at sanitary sump pump discharges.

GAS PRESSURE REGULATORS

When the gas pressure regulator is equipped with a vent connection, run a connection size vent to outside air in accordance to codes. Use a larger size vent when required by the manufacturer's installation instructions.

END OF SECTION 220523

SECTION 220529 – HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

SCOPE
This section includes specifications for supports of all plumbing equipment and materials as well as piping system anchors.

RELATED WORK
Section 033000 - Cast in place concrete.
Section 220700 - Plumbing Insulation for insulation protection at support devices.

REFERENCE
Applicable provisions of Division 1 shall govern work under this section.

REFERENCE STANDARDS
MSS SP-58
MSS SP-69

REFERENCE
Applicable provisions of Division 1 govern work under this section.

QUALITY ASSURANCE
Substitution of Materials: Refer to Section 012500 Substitution Procedures.

DESCRIPTION
Provide all supporting devices as required for the installation of mechanical equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for building piping.

Do not hang any mechanical item directly from a metal deck or run piping so its rests on the bottom chord of any truss or joist.

Fasteners depending on soft lead for holding power or requiring powder actuation will not be accepted.

Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.

Protect insulation at all hanger points; see Related Work above.

PART 2 - PRODUCTS

MANUFACTURERS
Anvil, B-Line, Pate, Piping Technology, Roof Products & Systems or approved equal.

STRUCTURAL SUPPORTS
Provide all supporting steel required for the installation of mechanical equipment and materials, including angles, channels, beams, etc. to suspended or floor supported tanks and equipment. All of this steel may not be specifically indicated on the drawings.

PIPE HANGERS AND SUPPORTS
HANGERS FOR PIPE SIZES 1/2" THROUGH 2":
Carbon steel, adjustable swivel ring. B-Line B3170NF, Anvil 69 or 70.
Carbon steel, adjustable clevis, standard. B-Line B3100, Anvil 260.

HANGERS FOR PIPE SIZES 2" AND LARGER:
Carbon steel, adjustable clevis, standard. B-Line B3100, Anvil 260.

MULTIPLE OR TRAPEZE HANGERS:
Steel channels with welded spacers and hanger rods.

WALL SUPPORT:
Carbon steel welded bracket with hanger. B-Line 3068 Series, Anvil 194 Series.

Perforated, epoxy painted finish, 16-12 gauge, min., steel channels securely anchored to wall structure, with interlocking, split-type, bolt secured, galvanized pipe/tubing clamps. B-Line type S channel with B-2000 series clamps, Anvil type PS 200 H with PS 1200 clamps. When copper piping is being supported, provide flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series, Anvil PS 1400 series.

VERTICAL SUPPORT:
Carbon steel riser clamp. B-Line B3373, Anvil 261 for above floor use.

FLOOR SUPPORT:
Carbon steel pipe saddle, stand and bolted floor flange. B-Line B3088T/B3093.

COPPER PIPE SUPPORTS:
All supports, fasteners, clamps, etc. directly connected to copper piping shall be copper plated or polyvinylchloride coated. Where steel channels are used, provide isolation collar between supports/clamps/fasteners and copper piping.

GLASS PIPE SUPPORTS:
All supports, clamps, etc. directly connected to glass piping shall be fully lined with 1/4" neoprene padding.

PIPE HANGER RODS
STEEL HANGER RODS:
Threaded both ends, threaded one end, or continuous threaded, complete with adjusting and lock nuts.

Size rods for individual hangers and trapeze support as indicated in the following schedule.

Total weight of equipment, including valves, fittings, pipe, pipe content, and insulation, are not to exceed the limits indicated.

Maximum Load (Lbs.) (650°F Maximum Temp.)	**Rod Diameter (inches)**
610	3/8
1130	1/2

BEAM CLAMPS
MSS SP-69 Types 19 & 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick with a retaining ring and threaded rod of 3/8, 1/2, and 5/8 inch diameter. Furnish with a hardened steel cup point set screw. B-Line B3036L/B3034, Anvil 86/92.

MSS SP-69 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1-1/2 inch diameter. B-Line B3054, Anvil 228.

PART 3 - EXECUTION

INSTALLATION
Size, apply and install supports and anchors in compliance with manufacturers recommendations.

Install supports to provide for free expansion of the piping system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.

Coordinate hanger and support installation to properly group piping of all trades.

Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes or continuous insert channels for the supporting steel. Where continuous insert channels are used, pipe supporting devices made specifically for use with the channels may be substituted for the specified supporting devices provided that similar types are used and all data is submitted for prior approval.

Size and install hangers and supports, except for riser clamps, for installation on the exterior of piping insulation. Where a vapor barrier is not required, hangers may be installed either on the exterior of pipe insulation or directly on piping.

Perform welding in accordance to standards of the American Welding Society.

HANGER AND SUPPORT SPACING

Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.

Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.

Use hangers with 1-1/2 inch minimum vertical adjustment.

Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

Support riser piping independently of connected horizontal piping.

Adjust hangers to obtain the slope specified in the piping section of these specifications.

Space hangers for pipe as follows:

Pipe Material	Pipe Size	Max. Horiz. Spacing	Max. Vert. Spacing
Cast Iron	2" and larger	5'-0"	15'-0"
Copper	1/2" through 3/4"	5'-0"	10'-0"
Copper	1" through 1-1/4"	6'-0"	10'-0"
Copper	1-1/2" through 2-1/2"	8'-0"	10'-0"
Copper	3"	10'-0"	10'-0"
Copper	4" and larger	12'-0"	10'-0"
Ductile Iron	All	10'-0"	20'-0"
Glass	Per Pipe Mfr.	8'-0"	12'-0"
Steel	1/2" through 1-1/4"	7'-0"	15'-0"
Steel	1-1/2" through 6"	10'-0"	15'-0"
Steel	8" through 12"	14'-0"	20'-0"
Steel	14" and over	20'-0"	20'-0"
Plastic	Drain and Vent	4'-0"	10'-0"
Plastic	1" or less	32"	4'-0"
Plastic	1-1/4" and over	4'-0"	6'-0"
Plastic	Pure Water 1-1/2” or less	Continuous	5’-0”

RISER CLAMPS
Support vertical piping with clamps secured to the piping and resting on the building structure or secured to the building structure below at each floor.

END OF SECTION 220529

SECTION 220700 – PLUMBING INSULATION

PART 1 - GENERAL

SCOPE
This section includes insulation specifications for plumbing piping and equipment.

RELATED WORK
Section 220500 - Common Work Results for Plumbing
Section 221100 - Facility Water Distribution
Section 221300 - Facility Sanitary Sewerage
Section 220529 - Hangers and Supports for Plumbing Piping and Equipment

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

ASTM B209	Aluminum and Aluminum Alloy Sheet and Plate
ASTM C165	Test Method for Compressive Properties of Thermal Insulations
ASTM C177	Heat Flux and Thermal Transmission Properties
ASTM C195	Mineral Fiber Thermal Insulation Cement
ASTM C240	Cellular Glass Insulation Block
ASTM C302	Density of Preformed Pipe Insulation
ASTM C303	Density of Preformed Block Insulation
ASTM C449	Mineral Fiber Hydraulic Setting Thermal Insulation Cement
ASTM C518	Heat Flux and Thermal Transmission Properties
ASTM C533	Calcium Silicate Block and Pipe Thermal Insulation
ASTM C534	Preformed Flexible Elastomeric Thermal Insulation
ASTM C547	Mineral Fiber Preformed Pipe Insulation
ASTM C552	Cellular Glass Block and Pipe Thermal Insulation
ASTM C553	Mineral Fiber Blanket and Felt Insulation
ASTM C578	Preformed, Block Type Cellular Polystyrene Thermal Insulation
ASTM C591	Preformed Rigid Cellular Polyurethane Thermal Insulation
ASTM C610	Expanded Perlite Block and Thermal Pipe Insulation
ASTM C612	Mineral Fiber Block and Board Thermal Insulation
ASTM C921	Properties of Jacketing Materials for Thermal Insulation
ASTM C1136	Flexible Low Permeance Vapor Retarders for Thermal Insulation
ASTM E84	Surface Burning Characteristics of Building Materials
MICA	National Commercial & Industrial Insulation Standards
NFPA 225	Surface Burning Characteristics of Building Materials
UL 723	Surface Burning Characteristics of Building Materials

QUALITY ASSURANCE
Substitution of Materials: Refer to Section 012500 Substitution Procedures.

Label all insulating products delivered to the construction site with the manufacturer's name and description of materials.

DESCRIPTION
Furnish and install all insulating materials and accessories as specified or as required for a complete installation. The following types of insulation are specified in this section:

- Pipe Insulation
- Equipment Insulation

Install all insulation in accordance to the latest edition of MICA (Midwest Insulation Contractors Association) Standard and manufacturer's installation instructions. Exceptions to these standards will only be accepted where specifically modified in these specifications, or where prior written approval has been obtained from the WisDOT Project Representative.

DEFINITIONS
Concealed: shafts, furred spaces, space above finished ceilings, utility tunnels and crawl spaces. All other areas, including walk-through tunnels, shall be considered as exposed.

SHOP DRAWINGS
Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening methods, fitting materials along with material safety data sheets and intended use of each material. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions.

PART 2 - PRODUCTS

MATERIALS
Materials or accessories containing asbestos will not be accepted.

Use composite insulation systems (insulation, jackets, sealants, mastics, and adhesives) that have a flame spread rating of 25 or less and smoke developed rating of 50 or less, with the following exceptions:

Insulation which is not located in an air plenum may have a flame spread rating not over 25 and a smoke developed rating no higher than 150.

INSULATION AND JACKETS
Manufacturers: Armstrong, Certainteed Manson, Childers, Dow, Extol, Halstead, H.B. Fuller, Imcoa, Knauf, Owens-Corning, Pittsburgh Corning, Rubatex, Johns-Mansville, or approved equal.

Insulating materials shall be fire retardant, moisture and mildew resistant, and vermin proof. Insulation shall be suitable to receive jackets, adhesives and coatings as indicated.

RIGID FIBERGLASS INSULATION:
Minimum nominal density of 3 lbs. per cu. ft., and thermal conductivity of not more than 0.23 at 75 degrees F, minimum compressive strength of 25 PSF at 10% deformation, rated for service to 450 degrees F.

White kraft reinforced foil vapor barrier all service jacket, factory applied to insulation with a self-sealing pressure sensitive adhesive lap, maximum permeance of .02 perms and minimum beach puncture resistance of 50 units.

SEMI-RIGID FIBERGLASS INSULATION:
Minimum nominal density of 3 lbs. per cu. ft., thermal conductivity of not more than 0.28 at 75 degrees F, minimum compressive strength of 125 PSF at 10% deformation, rated for service to 450 degrees F. Insulation fibers perpendicular to jacket and scored for wrapping cylindrical surfaces.

White kraft reinforced foil vapor barrier all service jacket, factory applied to insulation with a maximum permeance of .02 perms and minimum beach puncture resistance of 50 units.

ELASTOMERIC INSULATION:
Flexible closed cell, minimum nominal density of 5.5 lbs. per cu. ft., thermal conductivity of not more than 0.27 at 75 degrees F, minimum compressive strength of 4.5 psi at 25% deformation, maximum water vapor transmission of 0.17 perm inch, maximum water absorption of 6% by weight, rated for service range of -20 degrees F to 220 degrees F on piping and 180 degrees F where adhered to equipment.

POLYOLEFIN INSULATION:
Flexible closed cell, minimum nominal density of 1.5 lbs. per cu. ft., thermal conductivity of not more than 0.24 at 75 degrees F, minimum compressive strength of 5 psi at 25% deformation, maximum water vapor transmission of 0.0 perm inch, maximum water absorption of 0% by weight and volume, rated for service range of -165 degrees F to 210 degrees F.

PHENOLIC INSULATION:
Rigid closed cell, minimum nominal density of 2.2 lbs. per cu. ft., thermal conductivity of not more than 0.13 at 75 degrees F, minimum compressive strength of 31 psi parallel and 18 psi perpendicular, maximum water vapor transmission 0.117 perm inch, maximum water absorption of .5% by volume, rated for service range of -290 degrees F to 250 degrees F.

Kraft reinforced foil vapor barrier laminate all service jacket, factory applied to insulation with a self-sealing pressure sensitive adhesive lap, maximum permeance of .02 perms and minimum beach puncture resistance of 50 units.

EXTRUDED POLYSTYRENE INSULATION:
Rigid closed cell, minimum nominal density of 2.2 lbs. per cu. ft., thermal conductivity of not more than 0.2 at 75 degrees F, minimum compressive strength of 35 psi, maximum water vapor transmission of 1.1 perm inch, maximum water absorption of .1% by volume, rated for service range of -290 degrees F to 165 degrees F.

URETHANE INSULATION:
Rigid closed cell polyisocyanurate, minimum nominal density of 1.8 lbs. per cu. ft., thermal conductivity of not more than 0.19 at 75 degrees F aged 180 days, minimum compressive strength of 19 psi parallel and 10 psi perpendicular, maximum water vapor transmission of 4 perm inch, maximum water absorption of .2% by volume, rated for service range of -290 degrees F to 300 degrees F.

FIREPROOFING INSULATION:
Mineral fiber with nominal density of 8 lbs. per cu. ft., flame spread index of 15, fuel contribution index of 0, and smoke developed index of 0, thermal conductivity of not more than 0.23 at 75 degrees F.

Jacket material shall be the same as jacket for adjacent insulation.

PVC FITTING COVERS AND JACKETS:
White PVC film, gloss finish one side, semi-gloss other side, FS LP-535D, Composition A, Type II, Grade GU. Ultraviolet inhibited indoor/outdoor grade to be used where exposed to high humidity, ultraviolet radiation, in kitchens or food processing areas or installed outdoors. Jacket thickness to be .02 inch (20 mil).

METAL JACKETS:
.016 inch thick aluminum or .010 inch thick stainless steel with safety edge.

INSULATION INSERTS AND PIPE SHIELDS
Manufacturers: B-Line, Pipe Shields, Value Engineered Products

Construct inserts with calcium silicate, minimum 140 psi compressive strength. Piping 12” and larger, supplement with high density 600 psi structural calcium silicate insert. Provide galvanized steel shield. Insert and shield to be minimum 180 degree coverage on bottom of supported piping and full 360 degree coverage on clamped piping. On roller mounted piping and piping designed to slide on support, provide additional load distribution steel plate.

Where contractor proposes shop/site fabricated inserts and shields, submit schedule of materials, thicknesses, gauges and lengths for each pipe size to demonstrate equivalency to pre-engineered pre-manufactured product described above. On low temperature systems, extruded polystyrene may be substituted for calcium silicate provided insert and shield length and gauge are increased to compensate for lower insulation compressive strength.

Precompressed 20# density molded fiberglass blocks, Hamfab or equal, of same thickness as adjacent insulation may be substituted for calcium silicate inserts with one 1" x 6" block for piping through 2-1/2" and three 1" x 6" blocks for piping through 4". Submit shield schedule to demonstrate equivalency to pre-engineered/pre-manufactured product described above.

Wood blocks will not be accepted.

ACCESSORIES

All products shall be compatible with surfaces and materials on which they are applied, and be suitable for use at operating temperatures of the systems to which they are applied.

Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.

Insulation bands to be 3/4 inch wide, constructed of aluminum or stainless steel. Minimum thickness to be .015 inch for aluminum and .010 inch for stainless steel.

Tack fasteners to be stainless steel ring grooved shank tacks.

Staples to be clinch style.

Insulating cement to be ANSI/ASTM C195, hydraulic setting mineral wool.

Finishing cement to be ASTM C449.

Fibrous glass or canvas fabric reinforcing shall have a minimum untreated weight of 6 oz./sq. yd.

Bedding compounds to be non-shrinking and permanently flexible.

Vapor barrier coatings to be non-flammable, fire resistant, polymeric resin.

Fungicidal water base coating (Foster 40-20 or equal) to be compatible with vapor barrier coating.

PART 3 - EXECUTION

INSTALLATION

Install insulation, jackets and accessories in accordance to manufacturer's instructions and under ambient temperatures and conditions recommended by manufacturer. Surfaces to be insulated must be clean and dry.

Do not insulate systems or equipment which are specified to be pressure tested or inspected, until testing, inspection and any necessary repairs have been successfully completed.

Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Cover and seal exposed fiberglass insulation when insulation is terminated, no raw fiberglass insulation is allowed. Provide neat and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates. Install with longitudinal joints facing wall or ceiling.

Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.

Use full-length material (as delivered from manufacturer) wherever possible. Scrap piecing of insulation or pieces cut undersize and stretched to fit will not be accepted.

Insulation shall be continuous through sleeves and openings. Vapor barriers shall be maintained continuous through all penetrations.

Provide a complete vapor barrier for insulation on the following systems:

- Cold water (potable and non-potable)
- Equipment piping with a surface temperature below 65 degrees F

PIPING, VALVE, AND FITTING INSULATION

GENERAL:

Install insulation with butt joints and longitudinal seams closed tightly. Provide minimum 2” lap on jacket seams and 2” tape on butt joints, firmly cemented with lap adhesive. Additionally secure with staples along seams and butt joints. Coat staples with vapor barrier mastic on systems requiring vapor barrier.

Water supply piping insulation shall be continuous throughout the building and installed adjacent to and within building walls to a point directly behind the fixture that is being supplied.

Install insulation continuous through pipe hangers and supports with hangers and supports on the exterior of insulation. Where a vapor barrier is not required, hangers and supports may be attached directly to piping with insulation completely covering hanger or support and jacket sealed at support rod penetration. Where riser clamps are required to be attached directly to piping requiring vapor barrier, extend insulation and vapor barrier jacketing/coating around riser clamp.

INSULATION INSERTS AND PIPE SHIELDS:

Provide insulation inserts and pipe shields at all hanger and support locations. Inserts may be omitted on 3/4” and smaller copper piping provided 12” long 22 gauge pipe shields are used.

FITTINGS AND VALVES:
Fittings, valves, unions, flanges, couplings and specialties may be insulated with factory molded or built up insulation of the same thickness as adjoining insulation. Cover insulation with fabric reinforcing and mastic or where temperatures do not exceed 150 degrees, PVC fitting covers. Secure PVC fitting covers with tack fasteners and 1-1/2" band of mastic over ends, throat, seams or penetrations. On systems requiring vapor barrier, use vapor barrier mastic.

PROTECTIVE JACKETS:
Lap seams and joints a minimum of 2 inches and continuously seal with welding solvent recommended by jacket manufacturer. Lap slip joint ends 4" without fasteners where required to absorb expansion and contraction. For sections where vapor barrier is not required and jacket requires routine removal, tack fasteners may be used.

PIPE INSULATION SCHEDULE:
Provide insulation on new and existing remodeled piping as indicated in the following schedule:

Service	Insulation Types	Insulation Thickness by Pipe Size				
		1" and smaller	1-1/4" To 2"	2-1/2" to 4"	5" to 6"	8"and larger
Hot Water Supply	Rigid Fiberglass	1"	1"	1.5"	1.5"	1.5"
Hot Water Circulating	Rigid Fiberglass	1"	1"	1.5"		
Cold Water	Rigid Fiberglass	0.5"	0.5"	1"	1"	1"

* = Elastomeric & Phenolic types are acceptable

The following piping and fittings are not to be insulated:

- Chrome plated exposed supplies and stops (except where specifically noted).
- Water hammer arrestors.
- Piping unions and flanges for systems not requiring a vapor barrier.

SEMI-RIGID FIBERGLASS:
Apply insulation to equipment shells using weld pins, bonding adhesive, banded and wired in place. Fill all joints, seams and depressions with insulating cement to a smooth, even surface. Cover with reinforcing fabric and 2 coats of mastic. . Use vapor barrier mastic on systems requiring a vapor barrier.

END OF SECTION 220700

SECTION 221100 – FACILITY WATER DISTRIBUTION

PART 1 - GENERAL

SCOPE
This section contains specifications for plumbing pipe and pipe fittings for this project.

RELATED WORK
Section 220529 - Hangers and Supports for Plumbing Piping and Equipment
Section 220514 - Plumbing Specialties

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS
ANSI A21.4
ANSI A21.11
ANSI A21.51

ANSI B16.3	Malleable Iron Threaded Fittings
ANSI B16.4	Cast Iron Threaded Fittings
ANSI B16.5	Pipe Flanges and Flanged Fittings
ANSI B16.22	Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings
ANSI B16.29	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
ASTM A105	Forgings, Carbon Steel, for Piping Components
ASTM A126	Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A234	Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
ASTM B32	Solder Metal
ASTM B88	Seamless Copper Water Tube
ASTM B280	Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
ASTM B813	Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Alloy Tube
ASTM D1785	Poly Vinyl Chloride (PVC) Plastic Pipe
ASTM D2241	Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D2464	Threaded Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2466	Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2513	Thermoplastic Gas Pressure Pipe, Tubing, and Fittings
ASTM D2564	Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings
ASTM D2657	Heat Fusion Joining of Polyolefin Pipe and Fittings

ASTM D2774	Recommended Practice for Underground Installation of Thermoplastic Pressure Piping
ASTM D2855	Making Solvent Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings
ASTM D3139	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D3222	Unmodified Poly Vinylidene Fluoride (PVDF) Molding Extrusion and Coating Materials
ASTM D4101	Propylene Plastic Injection and Extrusion Materials
ASTM F437	Threaded Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F438	Socket Type Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 40
ASTM F441	Chlorinated Poly Vinyl Chloride (CPVC Plastic Pipe, Schedules 40 and 80
ASTM F493	Solvent Cements for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe and Fittings
ASTM F656	Primers for Use in Solvent Cement Joints of Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings
AWS A5.8	Brazing Filler Metal
AWWA C104	Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
AWWA C105	Polyethylene Encasement for Ductile Iron Piping for Water
AWWA C110	Ductile Iron and Gray Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids
AWWA C111	Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
AWWA C151	Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids
AWWA C153	Ductile Iron Compact Fittings, 3 In. Through 48 In., for Water and Other Liquids
AWWA C600	Installation of Ductile Iron Water Mains and Their Appurtenances
AWWA C651	Disinfecting Water Mains
AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution

SHOP DRAWINGS

Schedule from the contractor indicating the ASTM, AWWA or CISPI specification number of the pipe being proposed along with its type and grade if known at the time of submittal, and sufficient information to indicate the type and rating of fittings for each service.

Statement from manufacturer on his letterhead that pipe furnished meets the ASTM, AWWA or CISPI specification contained in this section.

QUALITY ASSURANCE
Substitution of Materials: Refer to Section 012500 Substitution Procedures.

Order all copper, cast iron, steel, PVC and polyethylene pipe with each length marked with the name or trademark of the manufacturer and type of pipe; with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier.

Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the State.

DELIVERY, STORAGE, AND HANDLING
Promptly inspect shipments to insure that the material is undamaged and complies with specifications.

Cover pipe to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above ground packaging.

Offsite storage agreements will not relieve the contractor from using proper storage techniques.

Storage and protection methods must allow inspection to verify products.

DESIGN CRITERIA
Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM, AWWA or CISPI specifications as listed in this specification.

Construct all piping for the highest pressures and temperatures in the respective system.

Non-metallic piping will be acceptable only for the services indicated. It will not be acceptable in ventilation plenum spaces, including plenum ceilings.

Where weld fittings or mechanical grooved fittings are used, use only long radius elbows having a centerline radius of 1.5 pipe diameters.

Where ASTM A53 type F pipe is specified, grade A type E or S, or grade B type E or S may be substituted at Contractor's option. Where the grade or type is not specified, Contractor may choose from those commercially available.

Where ASTM B88, type L H (drawn) temper copper tubing is specified, ASTM B88, type K H (drawn) temper copper tubing may be substituted at Contractor's option.

PART 2 - PRODUCTS

DOMESTIC WATER

ABOVE GROUND:

Type L copper water tube, H (drawn) temper, ASTM B88; wrought copper pressure fittings, ANSI B16.22; lead free (<.2%) solder, ASTM B32; flux, ASTM B813; copper phosphorous brazing alloy, AWS A5.8 BCuP. Copper mechanical grooved fittings and couplings on roll grooved pipe may be used in lieu of soldered fittings. Mechanically formed brazed tee connections may be used in lieu of specified tee fittings for branch takeoffs up to one-half (1/2) the diameter of the main.

DIELECTRIC UNIONS AND FLANGES

Watts Regulator Company, Lochinvar, Wilkins or EPCO Sales, Inc., dielectric unions 2" and smaller; dielectric flanges 2" and larger; with iron female pipe thread to copper solder joint or brass female pipe thread end connections, non-asbestos gaskets, having a pressure rating of not less than 175 psig at 180 degrees.

UNIONS AND FLANGES

Unions, flanges and gasket materials to have a pressure rating of not less than 150 psig at 180 degrees. Gasket material for flanges and flanged fittings shall be teflon type. Treated paper gaskets are not acceptable.

2" AND SMALLER STEEL:

ASTM A197/ANSI B16.3 malleable iron unions with brass seats. Use black malleable iron on black steel piping and galvanized malleable iron on galvanized steel piping.

2" AND SMALLER COPPER:

ANSI B16.18 cast bronze union coupling or ANSI B15.24 Class 150 cast bronze flanges.

2-1/2" AND LARGER STEEL:

ASTM A181 or A105, grade 1 hot forged steel flanges of threaded, welding neck, or slip-on pattern on black steel and threaded only on galvanized steel. Use raised face flanges ANSI B16.5 for mating with other raised face flanges or equipment with flat ring or full face gaskets. Use ANSI B16.1 flat face flanges with full face teflon gaskets for mating with other flat face flanges on equipment. Gaskets shall be teflon type.

2-1/2" AND LARGER COPPER:

ANSI B15.24 Class 150 cast bronze flanges with full face teflon gaskets.

PART 3 - EXECUTION

GENERAL

Install pipe and fittings in accordance to reference standards, manufacturers recommendations and recognized industry practices.

PREPARATION
Cut pipe ends square. Ream ends of piping to remove burrs. Clean scale and dirt from interior and exterior of each section of pipe and fitting prior to assembly.

ERECTION
Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of plumbing piping with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.

Where copper or steel piping is embedded in masonry or concrete, provide protective sleeve covering of elastomeric pipe insulation.

Install underground warning tape 6"-12" below finished grade above all exterior below ground piping. Where existing underground warning tape is encountered, repair and replace.

Maintain piping in clean condition internally during construction.

Provide clearance for installation of insulation, access to valves and piping specialties.

Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.

Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment

Install all valves and piping specialties, including items furnished by others, as specified and/or detailed. Provide access to valves and specialties for maintenance. Make connections to all equipment, fixtures and systems installed by others where same requires the piping services indicated in this section.

COPPER PIPE JOINTS
Remove all slivers and burrs remaining from the cutting operation by reaming and filing both pipe surfaces. Clean fitting and tube with metal brush, emery cloth or sandpaper. Remove residue from the cleaning operation, apply flux and assemble joint to socket stop. Apply flame to fitting until solder melts when placed at joint. Remove flame and feed solder into joint until full penetration of cup and ring of solder appears. Wipe excess solder and flux from joint.

THREADED PIPE JOINTS
Use a thread lubricant or teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

SOLVENT WELDED PIPE JOINTS
Install in accordance to ASTM D2855 "Making Solvent Cemented Joints With PVC Pipe and Fittings". Saw cut piping square and smooth. Tube cutters may be used if they are fitted with wheels designed for use with PVC/CPVC pipe that do not leave a raised bead on pipe exterior. Support and restrain pipe during cutting to prevent nicks and scratches. Bevel ends 10-15 degrees and deburr interior. Remove dust, drips, moisture, grease and other superfluous materials from pipe interior and exterior. Check dry fit of pipe and fittings. Reject materials which are out of round or do not fit within close tolerance. Use heavy body solvent cement for large diameter fittings.

Maintain pipe, fittings, primer and cement between 40 and 100 degrees during application and curing. Apply primer and solvent using separate daubers (3" and smaller piping only) or clean natural bristle brushes about 1/2 the size of the pipe diameter. Apply primer to the fitting socket and pipe surface with a scrubbing motion. Check for penetration and reapply as needed to dissolve surface to a depth of 4-5 thousandths. Apply solvent cement to the fitting socket and pipe in an amount greater than needed to fill any gap. While both surfaces are wet, insert pipe into socket fitting with a quarter turn to the bottom of the socket. Solvent cement application and insertion must be completed in less than 1 minute. Minimum of 2 installers is required on piping 4" and larger. Hold joint for 30 seconds or until set. Reference manufacturers recommendations for initial set time before handling and for full curing time before pressure testing. Cold weather solvent/cement may be utilized only under unusual circumstances and when specifically approved by the WisDOT Project Representative.

DOMESTIC WATER
Maintain piping system in clean condition during installation. Remove dirt and debris from assembly of piping as work progresses. Cap open pipe ends where left unattended or subject to contamination.

Prior to use, isolate and fill system with potable water. Allow to stand 24 hours. Flush each outlet proceeding from the service entrance to the furthest outlet for minimum of 1 minute and until water appears clear. Fill system with a solution of water and chlorine containing at least 50 parts per million of chlorine and allow to stand for 24 hours. Alternately a solution containing at least 200 parts per million of chlorine may be used and allowed to stand for 3 hours. Flush system with potable water until chlorine concentration is no higher than source water level.

Wait 24 hours after final flushing. Take samples of water for lab testing. The number and location of samples shall be representative of the system size and configuration and are subject to approval by Engineer. Test shall show the absence of coliform bacteria. If test fails, repeat disinfection and testing procedures until no coliform bacteria are detected. Submit test report indicating date and time of test along with test results.

DIELECTRIC UNIONS AND FLANGES
Install dielectric unions or flanges at each point where a copper-to-steel pipe connection is required in domestic water systems.

UNIONS AND FLANGES
Install a union or flange at each connection to each piece of equipment and at other items which may require removal for maintenance, repair, or replacement. Where a valve is located at a piece of equipment, locate the flange or union connection on the equipment side of the valve. Concealed unions or flanges are not acceptable.

PIPING SYSTEM LEAK TESTS
Isolate or remove components from system which are not rated for test pressure. Test piping in sections or entire system as required by sequence of construction. Do not insulate or conceal pipe until it has been successfully tested.

If required for the additional pressure load under test, provide temporary restraints at fittings or expansion joints. Backfill underground water mains prior to testing with the exception of thrust restrained valves which may be exposed to isolate potential leaks.

For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.

Inspect system for leaks. Where leaks occur, repair the area with new materials and repeat the test; caulking will not be acceptable.

Entire test must be witnessed by the Division's representative. All pressure tests are to be documented on forms to be provided to the contractor.

System	Test Medium	Initial Test Pressure	Duration	Final Test Pressure	Duration
*Below Ground Domestic Water	Water	N/A		200 psig	2 hr
Above Ground Domestic Water	Water	N/A		100 psig	8 hr

*Leakage on exterior mains 3" and larger may not exceed leakage calculated as follows:

$$\text{GPH Allowable Leakage} = \frac{(\text{Feet of Pipe})\,(\text{Inches Dia. of Pipe})\,(\text{Test Pressure})^{.5}}{133{,}200}$$

END OF SECTION 221100

PIPING SYSTEM TEST REPORT

State of Wisconsin
WisDOT

Date Submitted: _____

Project Name: _____

Location: _____ **WisDOT Project No:** _____

Contractor: _____

□ Plumbing □ Fire Sprinkler
Test Medium: □ Air □ Water □ Other

Test performed per specification section No. _____

Specified Test Duration _____ Hours Specified Test Pressure _____ PSIG

System Identification: _____
Describe Location: _____

_____

TEST DATE: _____
START TEST TIME: _____ INITIAL PRESSURE: _____ PSIG

Stop Test Time: _____ Final Pressure: _____ PSIG

TESTED BY: _____ WITNESSED BY: _____
TITLE: _____ TITLE: _____
SIGNED: _____ SIGNED: _____
DATE: _____ DATE: _____

Comments: _____

_____

_____

_____

SECTION 221300 – FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

SCOPE
This section contains specifications for plumbing pipe and pipe fittings for this project.

RELATED WORK
Section 220529 - Hangers and Supports for Plumbing Piping and Equipment
Section 220514 - Plumbing Specialties

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

ANSI A21.4	
ANSI A21.11	
ANSI A21.51	
ANSI B16.3	Malleable Iron Threaded Fittings
ANSI B16.4	Cast Iron Threaded Fittings
ANSI B16.5	Pipe Flanges and Flanged Fittings
ANSI B16.22	Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings
ANSI B16.29	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
ASTM A53	Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
ASTM A74	Cast Iron Soil Pipe and Fittings
ASTM A105	Forgings, Carbon Steel, for Piping Components
ASTM A126	Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
ASTM A234	Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
ASTM A861	High Silicon Iron Pipe and Fittings
ASTM A888	Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
ASTM B32	Solder Metal
ASTM B306	Copper Drainage Tube (DWV)
ASTM B813	Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Alloy Tube
ASTM C76	Reinforced Concrete Culvert, Storm Drain and Sanitary Pipe
ASTM C564	Standard Specifications for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
ASTM C1540	Standard Specifications for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings
ASTM D1785	Poly Vinyl Chloride (PVC) Plastic Pipe
ASTM D2241	Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D2466	Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40

ASTM D2564	Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings
ASTM D2665	Poly Vinyl Chloride (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
ASTM D2729	Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM D2774	Recommended Practice for Underground Installation of Thermoplastic Pressure Piping
ASTM D2855	Making Solvent Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings
ASTM D3034	Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
ASTM D3139	Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM D3212	Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D3222	Unmodified Poly Vinylidene Fluoride (PVDF) Molding Extrusion and Coating Materials
ASTM D3311	Drain, Waste and Vent (DWV) Plastic Fitting Patterns
AWS A5.8	Brazing Filler Metal
CISPI 301	Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications
CISPI 310	Couplings For Use In Connection With Hubless Cast Iron Soil Pipe And Fittings For Sanitary And Storm Drain, Waste And Vent Piping Applications

SHOP DRAWINGS

Schedule from the contractor indicating the ASTM, or CISPI specification number of the pipe being proposed along with its type and grade if known at the time of submittal, and sufficient information to indicate the type and rating of fittings for each service.

Statement from manufacturer on his letterhead that pipe furnished meets the ASTM, or CISPI specification contained in this section.

QUALITY ASSURANCE

Substitution of Materials: Refer to Section 012500 Substitution Procedures.

Order all copper, cast iron, steel, PVC and polyethylene pipe with each length marked with the name or trademark of the manufacturer and type of pipe; with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier.

Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the State.

DELIVERY, STORAGE, AND HANDLING

Promptly inspect shipments to insure that the material is undamaged and complies with specifications.

Cover pipe to prevent corrosion or deterioration while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above ground packaging.

Offsite storage agreements will not relieve the contractor from using proper storage techniques.

Storage and protection methods must allow inspection to verify products.

DESIGN CRITERIA
Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM, or CISPI specifications as listed in this specification.

Construct all piping for the highest pressures and temperatures in the respective system.

Non-metallic piping will be acceptable only for the services indicated. It will not be acceptable in ventilation plenum spaces, including plenum ceilings.

Where weld fittings or mechanical grooved fittings are used, use only long radius elbows having a centerline radius of 1.5 pipe diameters.

Where ASTM A53 type F pipe is specified, grade A type E or S, or grade B type E or S may be substituted at Contractor's option. Where the grade or type is not specified, Contractor may choose from those commercially available.

Where ASTM B88, type L H (drawn) temper copper tubing is specified, ASTM B88, type K H (drawn) temper copper tubing may be substituted at Contractor's option.

PART 2 - PRODUCTS

SANITARY WASTE AND VENT
INTERIOR ABOVE GROUND:
Hubless cast iron soil pipe and fittings, ASTM A888; with no-hub couplings, CISPI 301, CISPI 310, ASTM A74. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Pipe Institute or receive prior approval of the Engineer. Cast iron piping and fittings shall be of A B & I Foundry, Charlotte Pipe and Foundry, or Tyler Pipe manufacturers.

Type M copper water tube, H (drawn) temper, ASTM B88; with cast copper drainage fittings (DWV), ANSI B16.23; wrought copper drainage fittings (DWV), ANSI B16.29; lead free (<.2%) solder, ASTM B32; flux, ASTM B813; copper phosphorous brazing alloy, AWS A5.8 BCuP. Mechanically formed brazed tee connections may be used in lieu of specified tee fittings for vent branch takeoffs up to one-half (1/2) the diameter of the main.

PVC plastic pipe, Schedule 40, Class 12454-B (PVC 1120), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; socket fitting patterns, ASTM D3311; primer, ASTM F656; solvent cement, ASTM D2564.

INTERIOR BELOW GROUND:
Cast iron soil pipe and fittings, hub and spigot, service weight, ASTM A74, with neoprene rubber compression gaskets, ASTM C564, CISPI 301, and CISPI HSN 85. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Pipe Institute. Cast iron piping and fittings shall be of A B & I Foundry, Charlotte Pipe and Foundry, or Tyler Pipe manufacturers.

PVC plastic pipe, Schedule 40, Class 12454-B (PVC 1120), ASTM D1785; PVC plastic drain, waste and vent pipe and fittings, ASTM D2665; socket fitting patterns, ASTM D3311; primer, ASTM F656; solvent cement, ASTM D2564.

PART 3 - EXECUTION

GENERAL
Install pipe and fittings in accordance to reference standards, manufacturers recommendations and recognized industry practices.

PREPARATION
Cut pipe ends square. Ream ends of piping to remove burrs. Clean scale and dirt from interior and exterior of each section of pipe and fitting prior to assembly.

ERECTION
Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of plumbing piping with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.

Where copper or steel piping is embedded in masonry or concrete, provide protective sleeve covering of elastomeric pipe insulation.

Install underground warning tape 6"-12" below finished grade above all exterior below ground piping. Where existing underground warning tape is encountered, repair and replace.

Maintain piping in clean condition internally during construction.

Provide clearance for installation of insulation, access to valves and piping specialties.

Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.

Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment

Install all valves and piping specialties, including items furnished by others, as specified and/or detailed. Provide access to valves and specialties for maintenance. Make connections to all equipment, fixtures and systems installed by others where same requires the piping services indicated in this section.

COPPER PIPE JOINTS
Remove all slivers and burrs remaining from the cutting operation by reaming and filing both pipe surfaces. Clean fitting and tube with metal brush, emery cloth or sandpaper. Remove residue from the cleaning operation, apply flux and assemble joint to socket stop. Apply flame to fitting until solder melts when placed at joint. Remove flame and feed solder into joint until full penetration of cup and ring of solder appears. Wipe excess solder and flux from joint.

THREADED PIPE JOINTS
Use a thread lubricant or teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

SOLVENT WELDED PIPE JOINTS
Install in accordance to ASTM D2855 "Making Solvent Cemented Joints With PVC Pipe and Fittings". Saw cut piping square and smooth. Tube cutters may be used if they are fitted with wheels designed for use with PVC/CPVC pipe that do not leave a raised bead on pipe exterior. Support and restrain pipe during cutting to prevent nicks and scratches. Bevel ends 10-15 degrees and deburr interior. Remove dust, drips, moisture, grease and other superfluous materials from pipe interior and exterior. Check dry fit of pipe and fittings. Reject materials which are out of round or do not fit within close tolerance. Use heavy body solvent cement for large diameter fittings.

Maintain pipe, fittings, primer and cement between 40 and 100 degrees during application and curing. Apply primer and solvent using separate daubers (3" and smaller piping only) or clean natural bristle brushes about 1/2 the size of the pipe diameter. Apply primer to the fitting socket and pipe surface with a scrubbing motion. Check for penetration and reapply as needed to dissolve surface to a depth of 4-5 thousandths. Apply solvent cement to the fitting socket and pipe in an amount greater than needed to fill any gap. While both surfaces are wet, insert pipe into socket fitting with a quarter turn to the bottom of the socket. Solvent cement application and insertion must be completed in less than 1 minute. Minimum of 2 installers is required on piping 4" and larger. Hold joint for 30 seconds or until set. Reference manufacturers recommendations for initial set time before handling and for full curing time before pressure testing. Cold weather

solvent/cement may be utilized only under unusual circumstances and when specifically approved by the WisDOT Project Representative.

MECHANICAL HUBLESS PIPE CONNECTIONS
Place the gasket on the end of one pipe or fitting and the clamp assembly on the end of the other pipe or fitting. Firmly seat the pipe or fitting ends against the integrally molded shoulder inside the neoprene gasket. Slide the clamp assembly into position over the gasket. Tighten fasteners to manufacturers recommended torque.

SANITARY WASTE AND VENT
Verify invert elevations and building elevations prior to installation. Install exterior piping pitched to drain at indicated elevations and slope. Install interior piping pitched to drain at minimum slope of 1/4" per foot where possible and in no case less than 1/8" per foot for piping 3" and larger.

Install exterior piping below predicted frost level and not less than 5' bury depth to top of pipe wherever possible. Where piping is located above predicted frost level, provide frost protection in accordance to SPS 382.30(11)(c).

Flush piping inlets (floor drains, hub drains, mop basins, fixtures, etc.) with high flow of water at completion of project to demonstrate full flow capacity. Remove blockages and make necessary repairs where flow is found to be impeded.

PIPING SYSTEM LEAK TESTS
Isolate or remove components from system which are not rated for test pressure. Perform final testing for medical and lab gas with all system components in place. Test piping in sections or entire system as required by sequence of construction. Do not insulate or conceal pipe until it has been successfully tested.

If required for the additional pressure load under test, provide temporary restraints at fittings or expansion joints. Backfill underground water mains prior to testing with the exception of thrust restrained valves which may be exposed to isolate potential leaks.

For hydrostatic tests, use clean water and remove all air from the piping being tested by means of air vents or loosening of flanges/unions. Measure and record test pressure at the high point in the system.

For air or nitrogen tests, gradually increase the pressure to not more than one half of the test pressure; then increase the pressure in steps of approximately one-tenth of the test pressure until the required test pressure is reached. Examine all joints and connections with a soap bubble solution or equivalent method. System will not be approved until it can be demonstrated that there is no measurable loss of test pressure during the test period.

Inspect system for leaks. Where leaks occur, repair the area with new materials and repeat the test; caulking will not be acceptable.

Entire test must be witnessed by the WisDOT representative. All pressure tests are to be documented.

	Test	Initial Test		Final Test	
System	Medium	Pressure	Duration	Pressure	Duration
Sanitary Waste and Vent	Water	N/A		10'water	2 hr

END OF SECTION 221300

SECTION 224200 – COMMERCIAL PLUMBING FIXTURES

PART 1 - GENERAL

SCOPE
This section includes specifications for plumbing fixtures, faucets and trim.

RELATED WORK
Section 221100 - Facility Water Distribution
Section 221300 – Facility Sanitary Sewerage
Section 220529 – Hangers and Supports for Plumbing Piping and Equipment
Section 220514 – Plumbing Specialties

REFERENCE
Applicable provisions of Division 1 shall govern work under this section.

QUALITY ASSURANCE
Substitution of Materials: Refer to Section 012500 Substitution Procedures.

Plumbing products requiring approval by the State of Wisconsin Dept. of Safety and Professional Services must be approved or have pending approval at the time of shop drawing submission.

SHOP DRAWINGS
Include data concerning sizes, utility sizes, rough in-dimensions, capacities, materials of construction, ratings, weights, trim, finishes, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.

ENERGY EFFICIENCY REQUIREMENTS
Plumbing fixtures must meet the following maximum water usage requirements which are based upon Federal Energy Management Program (FEMP) performance requirements.

a. Lavatory Faucets, flow of 2 gpm or less and .25 gallon per cycle or less (based on inlet pressure of 60 p.s.i.)
b howerheads, flow of 2.2 gpm or less (based on inlet pressure of 80 p.s.i.)
c. Urinal Flush Valves, 1.0 gallon per flush or less.

PART 2 - PRODUCTS

PLUMBING FIXTURES
Manufacturers: Fixture descriptions establish fixture type, quality, materials, features and size. Products of the following manufacturers determined to be equal by the Architect/Engineer will be accepted.

- Water Closets - American Standard, Kohler, Crane, Eljer.
- Water Closet Seats - Bemis, Beneke, Centoco, Olsonite Sperzel.
- Urinals – American Standard, Kohler, Crane, Eljer.
- Lavatories – American Standard, Kohler, Zurn.
- Faucets - Chicago Faucet, Kohler, Speakman, Symmons, T&S Brass, Zurn.
- Drains - Chicago Faucet, Engineered Brass Co., Kohler, McGuire.
- Stops and Supplies - Chicago Faucet Co., T&S Brass, McGuire. (Heavy Duty Type Only)
- Flush Valves - Coyne & Delany, Sloan Royal, Zurn AV.
- Traps - Kohler, McGuire, Dearborn, Engineered Brass Co. (17 gauge Min.)
- Carriers and Supports - Josam, Smith, Wade, Watts Drainage, Zurn.
- Sinks - American Standard, Elkay, Just, Kohler.
- Showers - Leonard, Powers, Speakman, Symmons.
- Molded Tub and Shower Units – Aker, Aqua Glass, Fiat, Kohler, Lasco.
- Electric Water Coolers - Elkay, Halsey Taylor, Haws, Filtrine, Oasis, Sunroc.
- Garbage Disposer – InSinkerator, GE, Whirlpool

WATER CLOSETS

WC-1 - Floor mount bottom outlet white vitreous china siphon jet close coupled tank water closet with elongated bowl, 2-1/4" passageway, 14-1/2" rim height, insulating tank liner and 1.6 gallon flush.

- Fixture:Kohler Wellworth K-3422-U.
- Seat:Bemis 1655-SS/C white solid plastic open front seat.
- Supply & Stop: Chicago Faucet Co. No. 995-CP w/ 1/2" closet riser.

WC-2 - Floor mount bottom outlet white vitreous china siphon jet close coupled tank type water closet with elongated bowl, 2-1/4" passageway, 16-1/2" barrier free height, insulating tank liner and 1.6 gallon flush. ADA compliable.

- Fixture: Kohler Highline K-3427-U.
- Seat: Bemis 1655-SS/C white solid plastic open front seat.
- Supply & Stop: Chicago Faucet Co. No. 995-CP w/ 1/2" closet riser.

URINALS

UR-1 - Wall mount white vitreous china washout urinal with 3/4" top inlet spud, 2" outlet, removable strainer. Battery powered sensor operated flush valve, 1 gallon per flush or less.

- Fixture: Kohler Bardon K-4960-T.
- Flush Valve: Sloan Royal 8186-1.
- Carrier: Smith commercial grade adjusted for 24”" lip height.

UR-2 - Same as UR-1, barrier free adjusted for 16" lip height. Flush valve handle to be ADA compliant.

LAVATORIES
Lavatory faucets must meet maximum water usage requirements of 2 gpm flow or less and .25 gallon per cycle or less (based on inlet pressure of 60 p.s.i.)

L-1 - under mount white vitreous china lavatory.

- Fixture: Kohler Caxon 16" x 19" oval basin.
- Faucet: Bradley 1100 Series Model S53-329.
- Drain: Kohler K-13885 perforated strainer and 1-1/4" offset tailpiece.
- Trap: 1-1/4"x1-1/2" 17 ga. cast brass trap and tubular wall bend. With C.O. plug.
- Supplies & Stops: Chicago Faucet No. 1006CP.

SINKS
KS-1 - Counter mounted 18 ga. type 302 stainless steel double compartment sink.

- Fixture: Relocate existing
- Faucet: Relocate existing.
- Drains: Relocate existing
- Traps: 1-1/2"x1-1/2" 17 ga. cast brass trap and tubular wall bend.
- Supplies & Stops: Chicago Faucet No. 993-CP w/ 1/2" riser, length as necessary.
- Garbage disposal: InSinkErator model Evolution essential with ¾ HP motor, 120Volt, 1 phase, 60HZ. Or approved equal.

MOLDED SHOWER UNIT
SH-1 - One piece acrylic barrier free molded shower unit with dome ceiling, non-slip floor finish, grab bars, fold-up seat and 2" drain. Set unit into floor construction to maintain ADA required ½" threshold.

- Fixture: Kohler Freewill K-12100/12101.
- Drain: Kohler K-9132 2" drain with strainer.
- Valve: Speakman SM-1427-SCS.
- Shower Head: Speakman S-2252-AF/S-2520 (2.2 gpm @ 80 psi)

ELECTRIC WATER COOLERS
EWC-1 - Dual level, wall mounted, barrier free and standard height, stainless steel finish water cooler/drink fountain station with front pushbar operators. Single recessed steel mounting box with refrigeration system and stainless steel removable front grille for access. Rated for 8.0GPH at 80 degree inlet water at 90 degree ambient temperature and 50 degree outlet water., 1/5 HP compressor, 380 watt, 120/60/1. Mount so upper unit spout is at 40" above floor.

- Fixture: Elkay LKTE-8
- Traps: 1 1/4"x1 1/4" 17 ga. cast brass, with C.O. plug.
- Stops: 1/2" ball valve with ½" riser (concealed).

PART 3 - EXECUTION

INSTALLATION

Install plumbing fixtures in accordance to manufacturer's instructions. Set level and plumb. Secure in place to counters, floors and walls providing solid bearing and secure mounting. Bolt fixture carriers to floor and wall. Secure rough-in fixture piping to prevent movement of exposed piping.

Install each fixture with trap easily removable for servicing and cleaning. Install fixture stops in readily accessible location for servicing.

Install barrier free fixtures in compliance with IBC 1108 and 3408, COMM 52, 69 and Federal ADA Accessibility Guidelines. Install barrier free lavatory traps parallel and adjacent to wall and supplies and stops elevated to 27" above floor to avoid contact by wheelchair users.

Provide unions at water connections to drinking fountains and electric water coolers.

Each fixture shall have a stop valve installation to control the fixture. Stop valves shall be heavy duty type with brass stems and screwed or sweat inlet connections. Compression type inlets are not acceptable.

Cover pipe penetrations with escutcheons. Exposed traps, stops, piping and escutcheons to be chrome plated brass, same items in concealed locations may be of rough brass finish.

Set floor mounted water closets, floor mounted service sinks; counter mounted lavs and sinks; lav and sink faucets and drains with full setting bed of flexible non-staining plumber's putty. Cover exposed water closet bolts with bolt covers.

Seal openings between walls, floors and fixtures with mildew-resistant silicone sealant same color as fixture.

Test fixtures to demonstrate proper operation. Replace malfunctioning units or components. Adjust valves for intended water flow rate to fixtures without splashing, noise or overflow. Adjust self-closing lavatory faucets to 15 second cycle. Adjust shower valve temperature limit stops to 110 degree maximum outlet temperature.

Protect fixtures during construction. At completion clean plumbing fixtures and trim using manufacturer's recommended cleaning methods and materials.

Existing Fixtures: Where existing fixtures and fittings are indicated to be reused or relocated, this contractor is responsible for documenting condition prior to construction and for damages incurred during construction.

END OF SECTION 224200

DIVISION 23 - HVAC

SECTION 230500 – COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

SCOPE
This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections.

RELATED WORK
Section 230513 - Common Motor Requirements for HVAC.

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS
Abbreviations of standards organizations referenced in other sections are as follows:

AABC	Associated Air Balance Council
AGA	American Gas Association
AMCA	Air Movement and Control Association
ANSI	American National Standards Institute
ARI	Air Conditioning and Refrigeration Institute
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
EPA	Environmental Protection Agency
GAMA	Gas Appliance Manufacturers Association
ISA	Instrument Society of America
MCA	Mechanical Contractors Association
MICA	Midwest Insulation Contractors Association
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association. Inc.
UL	Underwriters Laboratories Inc.
ASTM E814	Standard Test Method for Fire Tests of Through-Penetration Fire Stops
ASTM E84	Standard Test Method for Surface Burning Characteristics of Building Materials
UL1479	Fire Tests of Through-Penetration Firestops
UL723	Surface Burning Characteristics of Building Materials

QUALITY ASSURANCE
Refer to Section 012500 Substitution Procedures.

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and for obtaining the performance from the system into which these items are placed. This may include changes found necessary during the testing, adjusting, and balancing phase of the project.

CONTINUITY OF EXISTING SERVICES
Do not interrupt or change existing services without prior written approval from the WisDOT Project Representative. When interruption is required, coordinate the down time with the user agency to minimize disruption to their activities. Unless specifically stated, all work involved in interrupting or changing existing services is to be done during normal working hours.

Furnish one can of touch up paint for each different color factory finish which is to be the final finished surface of the product. Deliver touch up paint with other "loose and detachable parts" as covered in the General Requirements.

SEALING AND FIRESTOPPING
Sealing and firestopping of sleeves/openings between ductwork, piping, etc. and the sleeve, structural or partition opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and fireproofing. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation.

SUBMITTALS
Refer to Division 1, General Conditions, Submittals.

Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents.

Before submitting electrically powered equipment, verify that the electrical power and control requirements for the equipment are in agreement with the motor starter schedule on the electrical drawings. Include a statement on the shop drawing transmittal to the architect/engineer that the equipment submitted and the motor starter schedule are in agreement or indicate any discrepancies. See related comments in Section 230513 in Part 1 under Electrical Coordination.

Include wiring diagrams of electrically powered equipment.

Submit sufficient quantities of shop drawings to allow the following distribution:

- Operating and Maintenance Manuals: 2 copies
- Testing, Adjusting and Balancing Contractor: 1 copy
- WisDOT: 1 copy
- A/E: 1 copy

Not more than two weeks after award of contract but before any shop drawings are submittal, the contractor shall submit the following piping system data sheet for each piping service on the project. The approved piping system data sheet(s) will be made available to the WisDOT Project Representative for their use on this project.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

OPERATING AND MAINTENANCE INSTRUCTIONS

Refer to Division 1, General Requirements, Operating and Maintenance Instructions.

Assemble material in three ring or post binders, using an index at the front of each volume and tabs for each system or type of equipment. In addition to the data indicated in the General Requirements, include the following information:

- Copies of all approved shop drawings.
- Manufacturer's wiring diagrams for electrically powered equipment
- Records of tests performed to certify compliance with system requirements
- Certificates of inspection by regulatory agencies
- Temperature control record drawings and control sequences
- Parts lists for manufactured equipment
- Valve schedules
- Lubrication instructions, including list/frequency of lubrication done during construction
- Warranties
- Additional information as indicated in the technical specification sections

TRAINING OF OWNER PERSONNEL

Instruct user agency personnel in the proper operation and maintenance of systems and equipment provided as part of this project; video tape all training sessions. Include not less than 2 hours of instruction, using the Operating and Maintenance manuals during this instruction. Demonstrate startup and shutdown procedures for all equipment. All training to be during normal working hours.

RECORD DRAWINGS
Refer to Division 1, General Requirements, Record Drawings.

In addition to the data indicated in the General Requirements, maintain temperature control record drawings on originals prepared by the installing contractor/subcontractor. Include copies of these record drawings with the Operating and Maintenance manuals.

PART 2 - PRODUCTS

ACCESS PANELS AND DOORS
LAY IN CEILINGS:
Removable lay in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration provided under Section 095123 are sufficient; no additional access provisions are required unless specifically indicated.

PLASTER WALLS AND CEILINGS:
16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers, and similar wet areas, concealed hinges, screwdriver operated cam latch for general applications, key lock for use in public areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the equipment needing service; minimum size is 12" by 12".

IDENTIFICATION
STENCILS:
Not less than 1 inch high letters/numbers for marking pipe and equipment.

SEALING AND FIRESTOPPING
FIRE AND/OR SMOKE RATED PENETRATIONS:

Manufacturers:
3M, Hilti, Rectorseal, STI/SpecSeal, Tremco, or approved equal.

All firestopping systems shall be provided by the same manufacturer.

Submittals:
Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgment can be based upon.

Product:
Fire stop systems shall be UL listed or tested by an independent testing laboratory approved by the Department of Commerce.

Use a product that has a rating not less than the rating of the wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.

Contractor shall use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop blocks, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

NON-RATED PENETRATIONS:
Pipe Penetrations Through Below Grade Walls:
In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated pipe and the cored opening or a water-stop type wall sleeve.

Pipe Penetrations:
At pipe penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between pipe insulation and sleeve. For non-rated drywall, plaster or wood partitions where sleeve is not required use urethane caulk in annular space between pipe insulation and wall material.

Duct Penetrations:
Annular space between duct (with or without insulation) and the non-rated partition or floor opening shall not be larger than 2". Where existing openings have an annular space larger than 2", the space shall be patched to match existing construction to within 2" around the duct.

Where shown or specified, pack annular space with fiberglass batt insulation or mineral wool insulation. Provide 4" sheet metal escutcheon around duct on both sides of partition or floor to cover annular space.

PART 3 - EXECUTION

DEMOLITION
Perform all demolition as indicated on the drawings to accomplish new work. Where demolition work is to be performed adjacent to existing work that remains in an occupied area, construct temporary dust partition to minimize the amount of contamination of the occupied space. Where pipe or duct is removed and not reconnected with new work, cap ends of existing services as if they were new work. Coordinate work with the user agency to minimize disruption to the existing building occupants.

All pipe, wiring and associated conduit, insulation, ductwork, and similar items demolished, abandoned, or deactivated are to be removed from the site by the Contractor. All piping and ductwork specialties are to be removed from the site by the Contractor unless they are dismantled and removed or stored by the user agency. All designated

equipment is to be turned over to the user agency for their use at a place and time so designated. Maintain the condition of material and/or equipment that is indicated to be reused equal to that existing before work began.

EXCAVATION AND BACKFILL
Perform all excavation and backfill work to accomplish indicated mechanical systems installation in accordance to Division 31 Earthwork. Blasting will not be allowed without written permission of the Architect/Engineer and the user agency.

Install lines passing under foundations with minimum of 1 1/2 inch clearance to concrete and insure there is no disturbance of bearing soil.

CONCRETE WORK
All cast in place concrete will be performed by the Division 3 Contractor unless otherwise noted. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for support of mechanical equipment.

CUTTING AND PATCHING
Refer to Section 017329.

BUILDING ACCESS
Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

EQUIPMENT ACCESS
Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance and service. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Access doors in general construction are to be furnished by the Mechanical Contractor and installed by the General Contractor.

Provide color coded thumb tacks or screws, depending on the surface, for use in accessible ceilings which do not require access panels.

COORDINATION
Verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to, diffusers, register, grilles, and recessed or semi recessed heating and/or cooling terminal units installed in/on architectural surfaces.

Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

Cooperate with the test and balance agency in ensuring Section 230593 specification compliance. Verify system completion to the test and balance agency (flushing, pressure testing, chemical treatment, filling of liquid systems, proper pressurization and air venting of hydronic systems, clean filters, clean strainers, duct and pipe systems cleaned, controls adjusted and calibrated, controls cycled through their sequences, etc.), ready for testing, adjusting and balancing work. Install dampers, shutoff and balancing valves, flow measuring devices, gauges, temperature controls, etc., required for functional and balanced systems. Demonstrate the starting, interlocking and control features of each system so the test and balance agency can perform its work.

LUBRICATION

Lubricate all bearings with lubricant as recommended by the manufacturer before the equipment is operated for any reason. Once the equipment has been run, maintain lubrication in accordance to the manufacturer's instructions until the work is accepted by WisDOT. Maintain a log of all lubricants used and frequency of lubrication; include this information in the Operating and Maintenance Manuals at the completion of the project.

SLEEVES

PIPE SLEEVES:

Provide galvanized sheet metal sleeves for pipe penetrations through interior and exterior walls to provide a backing for sealant or firestopping. Patch wall around sleeve to match adjacent wall construction and finish. Grout area around sleeve in masonry construction. In finished spaces where pipe penetration through wall is exposed to view, sheet metal sleeve shall be installed flush with face of wall.

Pipe sleeves are not required in interior non-rated drywall, plaster or wood partitions and sleeves are not required in existing poured concrete walls where penetrations are core drilled.

Pipe sleeves in new poured concrete construction shall be schedule 40 steel pipe (sized to allow insulated pipe to run through sleeve), cast in place.

Extend the top of sleeve 1 inch above the adjacent floor in piping floor penetrations located in the mechanical rooms and wet locations listed below. In finished areas sleeves shall be flush with rough floor.

For floor pipe penetrations through existing floors in mechanical rooms and wet locations listed below, core drill opening and provide 1-1/2”x 1-1/2” x 1/8” galvanized steel angles fastened to floor surrounding the penetration or group of penetrations to prevent water from getting to penetration. Provide urethane caulk between angles and floor and fasten angles to floor minimum 8” on center. Seal corners water tight with urethane caulk. Or, core drill sleeve opening large enough to insert schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. If the pipe penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the sleeve that will transfer weight to existing floor structure

For pipe penetrations through existing floors located in food service areas, core drill sleeve opening large enough to insert schedule 40 sleeve and grout area around sleeve with hydraulic setting, non-shrink grout. Size sleeve to allow insulated pipe to run through sleeve and paint the sleeve.

Pipe sleeves are not required in cored floor pipe penetrations through existing floors that are not located in mechanical rooms, food service areas or wet locations listed above.

DUCT SLEEVES:
Duct sleeves are not required in non-rated partitions or floors.

Provide sleeve required for fire dampers in fire-rated partitions and floors. Reference fire damper details on drawings.

For duct penetrations through mechanical room floors and wet locations listed below, provide 1-1/2”x 1-1/2” x 1/8” galvanized steel angles fastened to floor around the perimeter of the duct opening to prevent water from getting to floor opening. Provide urethane caulk between angles and floor and fasten angles to floor 8” on center. Seal corners water tight with urethane caulk.

SEALING AND FIRESTOPPING
FIRE AND/OR SMOKE RATED PENETRATIONS:
Install approved product in accordance to the manufacturer's instructions where pipes penetrate a fire/smoke rated surface. When pipe is insulated, use a product which maintains the integrity of the insulation and vapor barrier.

Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support any substantial weight.

NON-RATED PARTITIONS:
In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the pipe and tighten in place, in accordance to manufacturer's instructions.

At all interior partitions and exterior walls, pipe penetrations are required to be sealed. Apply sealant to both sides of the penetration in such a manner that the annular space between the pipe sleeve or cored opening and the pipe or insulation is completely blocked.

Duct penetrations through non-rated partitions shall require sheet metal escutcheons with fiberglass or mineral wool insulation fill for spaces that include laboratories, clean rooms, animal rooms, kitchens, cart wash rooms, janitor closets, cart wash rooms, toilet rooms, mechanical rooms, conference rooms, private consultation rooms, and where noted on drawings elsewhere.

END OF SECTION 230500

SECTION 230513 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

SCOPE
This sections includes requirements for single and three phase motors that are used with equipment specified in other sections.

RELATED WORK
Division 260000 - Electrical

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

ANSI/IEEE 112	Test Procedure for Polyphase Induction Motors and Generators
ANSI/NEMA MG-1	Motors and Generators
ANSI/NFPA 70	National Electrical Code

QUALITY ASSURANCE
Refer to Section 012500 Substitution Procedures.

SHOP DRAWINGS
Refer to Section 013300 Submittals.

Include with the equipment which the motor drives the following motor information: motor manufacturer, horsepower, voltage, phase, hertz, rpm, full load efficiency. Include project wiring diagrams prepared by the contractor specifically for this work.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

ELECTRICAL COORDINATION
All starters, overload relay heater coils, disconnect switches and fuses, relays, wire, conduit, pushbuttons, pilot lights, and other devices required for the control of motors or electrical equipment are furnished and installed by the Electrical Contractor, except as specifically noted elsewhere in this division of specifications.

Electrical drawings and/or specifications show number and horsepower rating of all motors furnished by this Contractor, together with their actuating devices if these devices are furnished by the Electrical Contractor. Should any discrepancy in size, horsepower rating, electrical characteristics or means of control be found for any motor or other electrical equipment after contracts are awarded, Contractor is to immediately notify the architect/engineer of such discrepancy. Costs involved in any changes required due to equipment substitutions initiated by this contractor will be the responsibility of this

contractor. See related comments in Section 230500 - Common Work Results for HVAC, under Shop Drawings.

Electrical Contractor will provide all power wiring and control wiring, except temperature control wiring.

Furnish project specific wiring diagrams to Electrical Contractor for all equipment and devices furnished by this Contractor and indicated to be wired by the Electrical Contractor.

PRODUCT CRITERIA
Motors to conform to all applicable requirements of NEMA, IEEE, ANSI, and NEC standards and shall be listed by U.L. for the service specified.

Select motors for conditions in which they will be required to perform; i.e., general purpose, splashproof, explosion proof, standard duty, high torque or any other special type as required by the equipment or motor manufacturer's recommendations.

Furnish motors for starting in accordance to utility requirements and compatible with starters as specified.

PART 2 - PRODUCTS

THREE PHASE, SINGLE SPEED MOTORS
Use NEMA rated 200 volt, three phase, 60 hertz motors for all motors 1/2 HP and larger unless specifically indicated.

Use NEMA general purpose, continuous duty, Design B , normal starting torque, T-frame or U-frame motors with Class B or better insulation unless the manufacturer of the equipment on which the motor is being used has different requirements. Use open drip-proof motors unless totally enclosed fan-cooled, totally enclosed non-ventilated, explosion-proof, or encapsulated motors are specified in the equipment sections.

Use grease lubricated anti-friction ball bearings with housings equipped with plugged/capped provision for relubrication, rated for minimum AFBMA 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at the end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.

All open drip-proof motors to have a 1.15 service factor. Other motor types may have minimum 1.0 service factors.

All motors 1 HP and larger, except specially wound motors and inline pump motors 56 frame and smaller, to be high efficiency design with full load efficiencies which meet or exceed the values listed below when tested in accordance to NEMA MG 1.

SINGLE PHASE, SINGLE SPEED MOTORS

Use NEMA rated 115 volt, single phase, 60 hertz motors for all motors 1/3 HP and smaller.

Use permanent split capacitor or capacitor start, induction run motors equipped with permanently lubricated and sealed ball or sleeve bearings and Class A insulation. Service factor to be not less than 1.35.

PART 3 - EXECUTION

INSTALLATION

Mount motors on a rigid base designed to accept a motor, using shims if required under each mounting foot to get a secure installation.

When motor will be flexible coupled to the driven device, mount coupling to the shafts in accordance to the coupling manufacturer's recommendations. Using a dial indicator, check angular misalignment of the two shafts; adjust motor position as necessary so that the angular misalignment of the shafts does not exceed 0.002 inches per inch diameter of the coupling hub. Again using the dial indicator, check the shaft for run-out to assure concentricity of the shafts; adjust as necessary so that run-out does not exceed 0.002 inch.

When motor will be connected to the driven device by means of a belt drive, mount sheaves on the appropriate shafts in accordance to the manufacturer's instructions. Use a straight edge to check alignment of the sheaves; reposition sheaves as necessary so that the straight edge contacts both sheave faces squarely. After sheaves are aligned, loosen the adjustable motor base so that the belt(s) can be added and tighten the base so that the belt tension is in accordance to the drive manufacturer's recommendations. Frequently recheck belt tension and adjust if necessary during the first day of operation and again after 80 hours of operation.

Verify the proper rotation of each three-phase motor as it is being wired or before the motor is energized for any reason.

Lubricate all motors requiring lubrication. Record lubrication material used and the frequency of use. Include this information in the maintenance manuals.

END OF SECTION 23 05 13

SECTION 230529 – HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

SCOPE
This section includes specifications for supports of all HVAC equipment and materials as well as piping system anchors.

RELATED WORK
Section 230700 - HVAC Insulation

REFERENCE
Applicable provisions of Division 1 shall govern work under this section.

REFERENCE STANDARDS
MSS SP-58 Materials, Design, Manufacture, Selection, Application, and Installation

QUALITY ASSURANCE
Refer to Section 012500 Substitution Procedures.

DESCRIPTION
Provide all supporting devices as required for the installation of mechanical equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for pressure piping.

Do not hang any mechanical item directly from a metal deck or run piping so it rests on the bottom chord of any truss or joist.

Support apparatus and material under all conditions of operation, variations in installed and operating weight of equipment and piping, to prevent excess stress, and allow for proper expansion and contraction.

Protect insulation at all hanger points; see Related Work above.

SHOP DRAWINGS
Refer to division 1, General Conditions, Submittals.

Schedule of all hanger and support devices indicating shields, attachment methods, and type of device for each pipe size and type of service. Reference section 23 05 00.

All submittals are to comply with submission and content requirements specified in specification 013300 Submittals.

DESIGN CRITERIA
Materials and application of pipe hangers and supports shall be in accordance to MSS Standard Practice SP-58 unless noted otherwise.

Piping flexible connections and vibration isolation supports are required for piping connected to coils that are in a fan assembly where the entire assembly is mounted on vibration supports; the vibration isolation supports are required for a distance of one hundred pipe diameters or three supports away from the equipment, whichever is greater. Piping flexible connection and vibration isolation supports are not required when the fan section is separately and independently isolated by means of vibration supports and duct flexible connections. Standard pipe hangers/supports as specified in this section are required when there are no vibration isolation devices in the piping and beyond the 100 pipe diameter/3 support distance.

Piping supported by laying on the bottom chord of joists or trusses will not be accepted.

Fasteners depending on soft lead for holding power or requiring powder actuation will not be accepted.

Allow sufficient space between adjacent pipes and ducts for insulation, valve operation, routine maintenance, etc.

PART 2 - PRODUCTS

PIPE HANGER AND SUPPORT MANUFACTURERS
Anvil, B-Line, Fee and Mason, Kindorf, Michigan Hanger, Unistrut, or approved equal. Anvil figure numbers are listed below; equivalent material by other manufacturers is acceptable.

STRUCTURAL SUPPORTS
Provide all supporting steel required for the installation of mechanical equipment and materials, whether or not it is specifically indicated or sized, including angles, channels, beams, etc. to suspend or floor support tanks and equipment.

PIPE HANGERS AND SUPPORTS
HANGERS FOR STEEL PIPE SIZES 1/2" THROUGH 2":
Carbon steel, adjustable, clevis, black finish. Anvil figure 65 or 260.

MULTIPLE OR TRAPEZE HANGERS:
Steel channels with welded spacers and hanger rods if calculations are submitted.

WALL SUPPORT:
Welded steel bracket with hanger. B-Line 3068 Series, Anvil 194 Series.

Perforated epoxy painted finish, 16-12 gauge min., steel channels securely anchored to wall structure with interlocking, split type, bolt secured, galvanized pipe/tubing clamps.

B-Line type S channel with B-2000 series clamps, Anvil type AS200 H with AS 1200 clamps. When copper piping is being supported, provide flexible elastomeric/thermoplastic isolation cushion material to completely encircle the piping and avoid contact with the channel or clamp, equal to B-Line B1999 Vibra Cushion or provide manufacturers clamp and cushion assemblies, B-Line BVT series, Anvil cushion clamp assembly.

VERTICAL RISER SUPPORT:
Carbon steel riser clamp, copper plated when used with copper pipe. Anvil figure 261 for steel pipe, figure CT121 for copper pipe.

FLOOR SUPPORT FOR PIPE SIZES THROUGH 4":
Cast iron adjustable pipe saddle, locknut nipple, floor flange, and concrete pier or steel support.

COPPER PIPE SUPPORT:
Carbon steel ring, adjustable, copper plated or polyvinylchloride coated.

INSULATION PROTECTION SHIELDS:
Galvanized carbon steel of not less than 18 gauge for use on insulated pipe 2-1/2 inch and larger. Minimum shield length is 12 inches. Equal to Anvil figure 167.

STEEL HANGER RODS:
Threaded both ends, threaded one end, or continuous threaded, black finish.

Size rods for individual hangers and trapeze support as indicated in the following schedule.

Total weight of equipment, including valves, fittings, pipe, pipe content, and insulation, are not to exceed the limits indicated.

Maximum Load (Lbs.) (650°F Maximum Temp.)	Rod Diameter (inches)
610	3/8
1130	1/2
1810	5/8

Provide rods complete with adjusting and lock nuts.

BEAM CLAMPS
MSS SP-58 Type 23 malleable black iron clamp for attachment to beam flange to 0.62 inches thick for single threaded rods of 3/8, 1/2, and 5/8 inch diameter, for use with pipe sizes 4 inch and less. Furnish with a hardened steel cup point set screw. Anvil figure 86.

MSS SP-58 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1-1/2 inch diameter but limited in application to pipe sizes 8 inch and less without prior approval. Anvil figure 228.

CONCRETE INSERTS
Carbon steel expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Hilti, Rawl, Redhead.

HEIGHT OF SUPPORTS:
Based on the length of the longest main support member, the height of the support member above the roof deck to be as follows:

Length of Longest Support Member (inches)	Min. Height of Support Above Finished Roof.
Up to 36”	18 inches
37” and Over	36 inches

SUPPORTS 18” OR LESS IN HEIGHT:

Prefabricated Metal Sleeper Curb:
Constructed of not less than 18 gauge galvanized steel reinforced so it is structurally capable of supporting the intended load with no penetrations through the curb flashing, inside and outside corner sections that are mitered and continuously welded, filled with 3 pound density rigid fiberglass insulation, integral deck mounting flange, nominal two inch wood nailer, galvanized steel counter flashing with metal receiver cap Attach a galvanized steel channel track for securing pipe or duct roller and roller support. Do not use built-in metal base flashings or cants.

Wood Build Sleeper Curb:
Constructed of wood blocking anchored to the deck. The curb must be structurally capable of supporting the intended load with no penetrations through the curb flashing. Galvanized steel counter flashing with metal receiver cap. Attach a steel channel track for securing pipe or duct roller support. Do not use built-in metal base flashings or cants.

Use galvanized structural steel members supported by pipe supports and use pipe or duct rollers fastened to the structural member. Pipe supports to be secured to the roof structure and sealed per pipe penetrations through roof specifications as specified in this section.

EQUIPMENT CURBS
Prefabricated Metal Curb:

Constructed of not less than 18 gauge galvanized steel reinforced so it is structurally capable of supporting the intended load with no penetrations through the curb flashing, inside and outside corner sections that are mitered and continuously welded, filled with 3 pound density rigid fiberglass insulation, integral deck mounting flange, nominal two inch wood nailer, galvanized steel counter flashing. Do not use built-in metal base

flashings or cants. Use 18 inch high equipment curbs where the curb completely surrounds the perimeter of the equipment and there is no roof exposed to the weather.

PIPE PENETRATIONS THROUGH ROOF
Multiple Pipe Penetrations:

Refer to acceptable Equipment Curb types listed above for curb specifications. An 8" high (minimum) curb height is required. The coping cap shall be constructed from laminated acrylic clad thermoplastic (ABS) with graduated step boots to accommodate various size pipes, stainless steel fastening screws for cover, stainless steel band clamps for securing boots around the pipe, and stainless steel band clamp or mechanical locking seal for securing boots around the ABS coping cap flanges.

Single Pipe Penetrations:

A stack flashing penetration may be utilized for single pipe penetrations through built up roofs and single ply membrane roofs. Utilize high temperature sealant for all high temperature applications. This includes but is not limited to steam condensate vent piping, steam safety relief piping, and flues.

A single pre-manufactured boot may be utilized for single pipe penetrations through single ply membrane roofs only.

PART 3 - EXECUTION

INSTALLATION
Install supports to provide for free expansion of the piping and duct system. Support all piping from the structure using concrete inserts, beam clamps, ceiling plates, wall brackets, or floor stands. Fasten ceiling plates and wall brackets securely to the structure and test to demonstrate the adequacy of the fastening.

Piping shall be supported independently from ductwork and all other trades.

Where piping can be conveniently grouped to allow the use of trapeze type supports, use standard structural shapes for the supporting steel.

Perform all welding in accordance to standards of the American Welding Society. Clean surfaces of loose scale, rust, paint or other foreign matter and properly align before welding. Use wire brush on welds after welding. Welds shall show uniform section, smoothness of weld metal and freedom from porosity and clinkers. Where necessary to achieve smooth connections, joints shall be dressed smooth.

HANGER AND SUPPORT SPACING
Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.

Where several pipes can be installed in parallel and at the same elevation, provide multiple or trapeze hangers.

Support riser piping independently of connected horizontal piping.

Adjust hangers to obtain the slope specified in the piping section of this specification.

Space hangers for pipe as follows:

Pipe Material	Pipe Size	Max. Spacing
Steel	1/2" through 1-1/4"	6'-6"
Steel	1-1/2" through 6"	10'-0"
Steel	8" through 12"	14'-0"
Steel	14" and over	20'-0"
Thermoplastic	All sizes	6'-0"
Copper	1/2" through 1-1/4"	5'-0"
Copper	1-1/2" and larger	8'-0"

VERTICAL RISER CLAMPS
Support vertical piping with clamps secured to the piping and resting on the building structure or secured to the building structure below at each floor.

ROOF MOUNTED SUPPORTS
Use for all pipe and ductwork on roof. Secure bottom of support flat on roof deck. Apply two coats of zinc rich paint to cut edges of all galvanized steel elements. Flashing and counter flashing by the General Contractor.

EQUIPMENT CURBS
Secure bottom of support flat on roof deck. Secure equipment to curb in accordance to equipment manufacturer's instructions. Flashing and counter flashing by the General Contractor.

Fill the entire void space with compressible fiberglass insulation.

PIPE PENETRATION THROUGH ROOF
Install at points where pipes penetrate roof. Install as shown on the drawings, as detailed and according to the manufacturer's installation instructions. Flashing and counterflashing by the General Contractor.

END OF SECTION 230529

SECTION 230593 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

SCOPE
This section includes air and water testing, adjusting and balancing for the entire project.

RELATED WORK
Section 230500 Common Work Results for HVAC
Section 230700 HVAC Insulation

REFERENCE
Applicable provisions of the General Conditions, Supplementary General Conditions and General Requirements in Division 1 govern work under this section.

REFERENCE STANDARDS
AABC National Standards for Total System Balance, Sixth Edition, 2002.
ASHRAE ASHRAE Handbook, 2007 HVAC Applications, Chapter 37, Testing Adjusting and Balancing.
NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems, Seventh Edition, 2005.
TABB Tab Procedural Guide, First Edition, 2003.

DESCRIPTION
The Contractor will separately contract with an independent test and balance agency to perform all testing, adjusting, and balancing of air and hydronic systems required for this project. Work related to the testing, adjusting, and balancing that must be performed by the installing mechanical contractor is specified in other section of these specifications.

Provide total mechanical systems testing, adjusting and balancing. Requirements include the balance of air and water distribution, adjustment of new and existing systems and equipment to provide design requirements indicated on the drawings, electrical measurement and verification of performance of all mechanical equipment, all in accordance to standards published by AABC, NEBB, or TABB.

Test, adjust and balance all air and hydronic systems so that each room, piece of equipment or terminal device meets the design requirements indicated on the drawings and in the specifications.

Accomplish testing, adjusting and balancing work in a timely manner that allows partial occupancy of major buildings, occupancy of one building when the project involves many buildings, and completion of the entire project in the time stated in the Instruction to Bidders and in accordance to the completion schedule established for this project.

Verify that provisions are being made to accomplish the specified testing, adjusting and balancing work. If problems are found, handle as specified in Part 3 under Deficiencies.

QUALITY ASSURANCE

Qualifications
An independent firm specializing in the Testing and Balancing of HVAC systems for a minimum of 3 years. A Firm not engaged in the commerce of furnishing or providing equipment or material generally related to HVAC work other than that specifically related to installing Testing and Balancing components necessary for work in this section such as, but not limited to sheaves, pulleys, and balancing dampers.

A certified member of AABC or certified by NEBB or TABB in the specific area of work performed. Maintain certification for the entire duration of the project. If certification of firm or any staff performing work is terminated or expires during the duration of the project, contact WisDOT immediately.

Technicians on this project must have satisfactorily completed work on a minimum of 3 projects of at least 50% in size, and of similar complexity. Size is defined as the quantity of each specific individual item requiring testing and balancing such as, but not limited to, equipment, devices, terminal devices, and grilles and diffusers.

Submit Qualifications of firm and project staff to WISDOT upon requested.

PRE-INSTALLATION MEETING AND SCHEDULING

The test and balance agency is required to attend a pre-installation meeting with all other project contractors before the construction process is started. The test and balance agency shall give the Lead Contractor a detailed schedule of testing and balancing tasks for incorporation into the project schedule. Reference Section 013200 Construction Progress Documentation for Lead Contractor responsibilities for scheduling.

PRE-BALANCE CONFERENCE

90 days prior to beginning testing, adjusting and balancing, schedule and conduct a conference with the Architect/Engineer, WisDOT's Project Representative and the mechanical system and temperature control system installing Contractors. Provide AE and Commissioning Provider (CxP) with a complete copy of the TAB plan for the project. The objective is final coordination and verification of system operation and readiness for testing, adjusting and balancing procedures and scheduling procedures with the above mentioned parties. Indicate work required to be completed prior to testing, adjusting, and balancing and identify the party responsible for completion of that work.

SUBMITTALS

See also Related Work in this section.

Submit testing, adjusting and balancing reports bearing the seal and signature of the NEBB, AABC or TABB Certified Test and Balance Supervisor. The reports certify that the systems have been tested, adjusted and balanced in accordance to the referenced standards; are an accurate representation of how the systems have been installed and are

operating; and are an accurate record of all final quantities measured to establish normal operating values of the systems.

Submission:

Distribute electronic copies of the Report to the Contractor, the Project Coordinator, the WisDOT Project Representative , the Prime A/E,

Enter a RFI, requesting review of the report.

Enter a RFI, with a copy of the Testing and Balancing Report Summary as an upload, indicating that the Testing and Balancing Report is posted on the WisBuild Project Overview page and requesting review of the report.

Format: Cover page identifying project name, project number and descriptive title of contents. Divide the contents of the report into the below listed divisions:

- General Information
- Summary
- Air Systems

Contents: Provide the following minimum information, forms and data:

General Information: Inside cover sheet identifying Test and Balance Agency, Contractor, Architect, Engineer, Project Name and Project Number. Include addresses, contact names and telephone numbers. Also include a certification sheet containing the seal and signature of the Test and Balance Supervisor.

Summary: Provide summary sheet describing mechanical system deficiencies. Describe objectionable noise or drafts found during testing, adjusting and balancing. Provide recommendations for correcting unsatisfactory performances and indicate whether modifications required are within the scope of the contract, are design related or installation related. List instrumentation used during testing, adjusting and balancing procedures.

The remainder of the report to contain the appropriate standard NEBB, AABC, or TABB forms for each respective item and system. Fill out forms completely. Where information cannot be obtained or is not applicable indicate same.

PART 2 - PRODUCTS

INSTRUMENTATION

Provide all required instrumentation to obtain proper measurements. Application of instruments and accuracy of instruments and measurements to be in accordance to the requirements of NEBB, AABC, or TABB Standards and instrument manufacturer's specifications.

All instruments used for measurements shall be accurate, and calibration histories for each instrument to be available for examination by DD upon request. Calibration and maintenance of all instruments to be in accordance to the requirements of NEBB, AABC, or TABB Standards

PART 3 - EXECUTION

DAILY REPORTS

Submit to WisDOT's Project Representative daily work activity reports for each day on which testing and balancing work is performed. Reports shall include description of day's activities and description of any system deficiencies.

PRELIMINARY PROCEDURES

Review preconstruction meeting report, applicable construction bulletins, applicable change orders and approved shop drawings of equipment, outlets/inlets and temperature controls.

Check filters for cleanliness, dampers and valves for correct positioning, equipment for proper rotation and belt tension, temperature controls for completion of installation and hydronic systems for proper charge and purging of air.

Notify WisDOT's Project Representative on a daily basis during balancing. Identify deficiencies preventing completion of testing, adjusting and balancing procedures. Do not proceed until systems are fully operational with all components necessary for complete testing, adjusting and balancing. Installing Contractors are required to provide personnel to check and verify system completion, readiness for balancing and assist Balancing Agency in providing specified system performance.

PERFORMING TESTING, ADJUSTING AND BALANCING

Perform testing, adjusting and balancing procedures on each system identified, in accordance to the detailed procedures outlined in the referenced standards except as may be modified below.

Unless specifically instructed in writing, all work in this specification section is to be performed during the normal workday.

In areas containing ceilings, remove ceiling tile to accomplish balancing work; replace tile when work is complete and provide new tile for any tile that are damaged by this procedure. If the ceiling construction is such that access panels are required for the work of this section and the panels have not been provided, inform the owner's project representative.

Cut insulation, ductwork and piping for installation of test probes to the minimum extent necessary for adequate performance of procedures. Patch using materials identical to those removed, maintaining vapor barrier integrity and pressure rating of systems.

In air systems employing filters, blank off sufficient filter area to simulate a pressure drop that is midway between that of a clean filter and that of a dirty filter.

Measure and record system measurements at the fan and/or pump to determine total flow. Adjust equipment as required to yield specified total flow at terminals. Proceed taking measurements in mains and branches as required for final terminal balancing. Perform terminal balancing to specified flows balancing branch dampers, deflectors, extractors and valves prior to adjustment of terminals.

Measure and record static air pressure conditions across fans, coils and filters. Indicate in report if cooling coil measurements were made on a wet or dry coil and if filter measurements were made on a clean or dirty filter. Spot check static air pressure conditions directly ahead of terminal units.

Adjust outside air, return air and relief air dampers for design conditions at both the minimum and maximum settings and record both sets of data. Balance modulating dampers at extreme conditions and record both sets of data. Balance variable air volume systems at maximum air flow rate, full cooling, and minimum flow rate, full heating; record all data.

Adjust register, grille and diffuser vanes and accessories to achieve proper air distribution patterns and uniform space temperatures free from objectionable noise and drafts within the capabilities of the installed system.

Provide fan and motor drive sheave adjustments necessary to obtain design performance. Provide drive changes specifically noted on drawings, if any. If work of this section indicates that any drive or motor is inadequate for the application, advise the owner's project representative by giving the representative properly sized motor/drive information (in accordance to manufacturers original service factor and installed motor horsepower requirements); Confirm any change will keep the duct/piping system within its design limitations with respect to speed of the device and pressure classification of the distribution system. Required motor/drive changes not specifically noted on drawings or in specifications will be considered an extra cost and will require an itemized cost breakdown submitted to owner's project representative. Prior authorization is needed before this work is started.

Areas or rooms designed to maintain positive, negative or balanced air pressures with respect to adjacent spaces, as indicated by the design air quantities, require special attention. Adjust fan drives, distribution dampers, terminals and controls to maintain indicated pressure relationship.

Final air system measurements to be within the following range of specified cfm:

Fans	0% to +10%
Supply grilles, registers, diffusers	0% to +10%
Return/exhaust grilles, registers	0% to -10%
Room pressurization air	-5% to +5%

Contact the temperature control Contractor for assistance in operation and adjustment of controls during testing, adjusting and balancing procedures. Cycle controls and verify proper operation and setpoints. Include in report description of temperature control operation and any deficiencies found.

Permanently mark equipment settings, including damper and valve positions, control settings, and similar devices allowing settings to be restored. Set and lock memory stops.

Leave systems in proper working order, replacing belt guards, closing access doors and electrical boxes, and restoring temperature controls to normal operating settings.

Coordinate and assist CxP with all verification activities defined within section 013300 Submittals including providing all required sampling date necessary for the commissioning process.

Verify and record, in the T&B Report, “K” factors for all VAV air terminal devices and air flow stations.

Coordinate air handling unit minimum outside air set points with the Temperature Control Contractor.

Coordinate Fume Hood Monitor calibration with the Fume Hood Manufacturer.

VAV SUPPLY AND EXHAUST DUCT SYSTEM STATIC PRESSURE SET POINT

For VAV supply and exhaust systems with VAV air terminal devices, determine the minimum required duct static pressure at the DDC static pressure sensor location(s) needed to insure that all VAV air terminals are operating at their design airflows with the most demanding VAV terminal wide open. Provide these static pressure numbers to the DDC temperature controls contractor and record them in the T&B report for each system.

DEFICIENCIES

Division 23 00 00 contractor to correct any installation deficiencies found by the test and balance agency that were specified and/or shown on the Contract Documents to be performed as part of that division of work. Test and balance agency will notify the WisDOT's Project Representative of these items and instructions will be issued to the Division 23 00 00 contractor for correction of the deficient work. All corrective work to be done at no cost to the State of Wisconsin. Retest mechanical systems, equipment, and devices once corrective work is complete as specified.

FUNCTIONAL PERFORMANCE TESTING
Contractor is responsible for utilizing the functional performance test.

END OF SECTION 230593

SECTION 230700 – HVAC INSULATION

PART 1 - GENERAL

SCOPE
This section includes insulation specifications for heating, ventilating and air conditioning piping, ductwork and equipment.

RELATED WORK
Section 230500 - Common Work Results for HVAC
Section 230529 - Hangers and Supports for HVAC Piping and Equipment
Section 233100 - HVAC Ducts and Casings

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

ASTM B209	Aluminum and Aluminum Alloy Sheet and Plate
ASTM C165	Test Method for Compressive Properties of Thermal Insulations
ASTM C177	Heat Flux and Thermal Transmission Properties
ASTM C195	Mineral Fiber Thermal Insulation Cement
ASTM C240	Cellular Glass Insulation Block
ASTM C302	Density of Preformed Pipe Insulation
ASTM C303	Density of Preformed Block Insulation
ASTM C355	Test Methods for Test for Water Vapor Transmission of Thick Materials
ASTM C449	Mineral Fiber Hydraulic Setting Thermal Insulation Cement
ASTM C518	Heat Flux and Thermal Transmission Properties
ASTM C533	Calcium Silicate Block and Pipe Thermal Insulation
ASTM C534	Preformed Flexible Elastomeric Thermal Insulation
ASTM C547	Mineral Fiber Preformed Pipe Insulation
ASTM C552	Cellular Glass Block and Pipe Thermal Insulation
ASTM C553	Mineral Fiber Blanket and Felt Insulation
ASTM C578	Preformed, Block Type Cellular Polystyrene Thermal Insulation
ASTM C591	Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C610	Expanded Perlite Block and Thermal Pipe Insulation
ASTM C612	Mineral Fiber Block and Board Thermal Insulation
ASTM C921	Properties of Jacketing Materials for Thermal Insulation
ASTM C1136	Flexible Low Permeance Vapor Retarders for Thermal Insulation
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
ASTM D1000	Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
ASTM D1621	Standard Test Method for Compressive Properties Of Rigid Cellular Plastics

ASTM D1622	Standard Test Method for Apparent Density of Rigid Cellular Plastics
ASTM D1940	Method of Test for Porosity of Rigid Cellular Plastics
ASTM D2126	Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
ASTM D2240	Standard Test Method for Rubber Property—Durometer Hardness
ASTM E84	Surface Burning Characteristics of Building Materials
ASTM E814	Standard Test Method for Fire Tests of Penetration Firestop Systems
ASTM E2336	Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems
MICA	National Commercial & Industrial Insulation Standards
NFPA 225	Surface Burning Characteristics of Building Materials
UL 723	Surface Burning Characteristics of Building Materials

QUALITY ASSURANCE
Refer to Section 012500 Substitution Procedures

Label all insulating products delivered to the construction site with the manufacturer's name and description of materials.

Insulation systems shall be applied by experienced contractors. Within the past 5 years, the contractor shall be able to document the successful completion of a minimum of 3 projects of at least 50% of the size and similar scope of the work specified in this section.

DESCRIPTION
Furnish and install all insulating materials and accessories as specified or as required for a complete installation. The following types of insulation are specified in this section:

- Pipe Insulation
- Duct Insulation
- Equipment Insulation

Install all insulation in accordance to the latest edition of MICA (Midwest Insulation Contractors Association) Standard and manufacturer's installation instructions. Exceptions to these standards will only be accepted where specifically modified in these specifications, or where prior written approval has been obtained from the DFD Project Representative.

DEFINITIONS
Concealed: shafts, furred spaces, space above finished ceilings, utility tunnels and crawl spaces. All other areas, including walk-through tunnels, shall be considered as exposed.

SHOP DRAWINGS
Refer to Section 013300 Submittals.

Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening methods, fitting materials along with material safety data sheets and

intended use of each material. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

ENVIRONMENTAL REQUIREMENTS
Do not store insulation materials on grade or where they are at risk of becoming wet. Do not install insulation products that have been exposed to water.

Protect installed insulation work with plastic sheeting to prevent water damage.

PART 2 - PRODUCTS

MATERIALS
Manufacturers: Armacell, Certainteed, Manson, Childers, Dow, Extol, Fibrex, Halstead, H.B. Fuller, Imcoa, Johns Manville, Knauf, Owens-Corning, Partek, Pittsburgh Corning, Rubatex, Venture Tape or approved equal.

Materials or accessories containing asbestos will not be accepted.

Use composite insulation systems (insulation, jackets, sealants, mastics, and adhesives) that have a flame spread rating of 25 or less and smoke developed rating of 50 or less, with the following exceptions:

Pipe insulation which is not located in an air plenum may have a flame spread rating not over 25 and a smoke developed rating no higher than 450 when tested in accordance to UL 723 and ASTM E84.

INSULATION TYPES
Insulating materials shall be fire retardant, moisture and mildew resistant, and vermin proof. Insulation shall be suitable to receive jackets, adhesives and coatings as indicated.

FLEXIBLE FIBERGLASS INSULATION:
Minimum nominal density of 0.75 lbs. per cu. ft., and thermal conductivity of not more than 0.3 at 75 degrees F, rated for service to 250 degrees F.

RIGID FIBERGLASS INSULATION:
Minimum nominal density of 3 lbs. per cu. ft., and thermal conductivity of not more than 0.23 at 75 degrees F, minimum compressive strength of 25 PSF at 10% deformation, rated for service to 450 degrees F.

SEMI-RIGID FIBERGLASS INSULATION:
Minimum nominal density of 3 lbs. per cu. ft., thermal conductivity of not more than 0.28 at 75 degrees F, minimum compressive strength of 125 PSF at 10% deformation, rated for service to 450 degrees F. Insulation fibers perpendicular to jacket and scored for wrapping cylindrical surfaces.

ELASTOMERIC INSULATION:
Flexible closed cell, minimum nominal density of 5.5 lbs. per cu. ft., thermal conductivity of not more than 0.27 at 75 degrees F, minimum compressive strength of 4.5 psi at 25% deformation, maximum water vapor permeability of 0.17 perm inch, maximum water absorption of 6% by weight, rated for service range of -20 degrees F to 220 degrees F on piping and 180 degrees F where adhered to equipment.

POLYOLEFIN INSULATION:
Flexible closed cell, minimum nominal density of 1.5 lbs. per cu. ft., thermal conductivity of not more than 0.24 at 75 degrees F, minimum compressive strength of 5 psi at 25% deformation, maximum water vapor permeability of 0.0 perm inch, maximum water absorption of 0% by weight and volume, rated for service range of -165 degrees F to 210 degrees F.

POLYISOCYANURATE INSULATION:
Rigid closed cell polyisocyanurate, minimum nominal density of 2.0 lbs. per cu. ft., thermal conductivity of not more than 0.19 at 75 degrees F aged 180 days, minimum compressive strength of 24 psi parallel and 13 psi perpendicular, maximum water vapor permeability of 4 perm inch, maximum water absorption of 2% by volume, rated for service range of -290 degrees F to 300 degrees F.

FIRE-STOP INSULATION:
Noncombustible, non-asbestos, non-ceramic fiber, high temperature blanket or board fireproofing insulation, constructed of calcium silicate or calcium/magnesium/silica amorphous wool with 2-hour ASTM E814 “F” and “T” fire ratings, UL or equivalent third party listed, labeled and specifically evaluated for such purpose in accordance to ASTM E2336. Foil-scrim-polyethylene fiberglass reinforced factory applied jacket.

JACKETS
PVC FITTING COVERS AND JACKETS (PFJ):
White PVC film, gloss finish one side, semi-gloss other side, FS LP-535D, Composition A, Type II, Grade GU. Ultraviolet inhibited indoor/outdoor grade to be used where exposed to high humidity, ultraviolet radiation, in kitchens or food processing areas or installed outdoors. Jacket thickness to be minimum .02” indoors/.03” outdoors for piping 12” and smaller, .03” indoors/.04” outdoors for piping 15” and larger.

ALL SERVICE JACKETS (ASJ):
Heavy duty, fire retardant material with white kraft reinforced foil vapor barrier, factory applied to insulation with a self-sealing pressure sensitive adhesive lap, maximum permeance of .02 perms and minimum beach puncture resistance of 50 units.

FOIL SCRIM ALL SERVICE JACKETS (FSJ):
Glass fiber reinforced foil kraft laminate, factory applied to insulation. Maximum permeance of .02 perms and minimum beach puncture resistance of 25 units.

PROTECTIVE METAL JACKETS (PMJ):
.016 inch thick aluminum or .010 inch thick stainless steel with safety edge.

SELF-ADHERING JACKETS (SAJ):
5-ply, self-adhering multiple laminated waterproofing material with reflective aluminum foil, high density polymer films and cold weather acrylic adhesive providing zero (0.0) permeability. Minimum 6 mils material thickness, 35lb puncture resistance when tested in accordance to ASTM D1000 and flame spread/smoke developed rating of 10/20 when tested in accordance to UL 723.

Vapor retarding tape shall be specifically designed and manufactured for use with the self-adhering jacket specified above. Tape shall be provided by the same manufacturer that provides jacketing. Vapor retarding tapes used with self-adhering jackets shall have a maximum permeance of 0.0 perms.

FABRIC REINFORCED MASTIC JACKETS (FMJ):
Glass fiber reinforcing fabric imbedded in weather barrier mastic as per manufacturer's recommended procedure for 2 coat application.

VAPOR RETARDING JACKETS (VRJ):
Polyvinylidene chloride (PVDC) vapor retarding jacket material with minimum 6 mils material thickness and maximum permeance of 0.01 perms. Material shall not support the growth of mold or mildew. Dow Saran or equivalent.

Vapor retarding tape shall be specifically designed and manufactured for use with the vapor retarding jacket specified above. Tape shall be provided by the same manufacturer that provides jacketing. Vapor retarding tapes used with vapor retarding jackets shall have a maximum permeance of 0.01 perms.

PART 3 - EXECUTION

EXAMINATION
Verify that all piping, equipment, and ductwork are tested and approved prior to installing insulation. Do not insulate systems until testing and inspection procedures are completed.

Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

INSTALLATION
All materials shall be installed by skilled labor regularly engaged in this type of work. All materials shall be installed in strict accordance with manufacturer's recommendations, building codes, and industry standards. Do not install products when the ambient temperature or conditions are not consistent with the manufacturer's recommendations. Surfaces to be insulated must be clean and dry.

Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation.

Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates.

Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.

Use full length material (as delivered from manufacturer) wherever possible. Scrap piecing of insulation or pieces cut undersize and stretched to fit will not be accepted.

All pipe and duct insulation shall be continuous through walls, ceiling or floor openings and through sleeves except where firestop or firesafing materials are required. Vapor barriers shall be maintained continuous through all penetrations.

Provide a continuous unbroken moisture vapor barrier on insulation applied to systems noted below. Attachments to cold surfaces shall be insulated and vapor sealed to prevent condensation.

Provide a complete vapor barrier for insulation on the following systems:

- Refrigerant
- Insulated Duct
- Equipment, ductwork or piping with a surface temperature below 65 degrees F

PROTECTIVE JACKET INSTALLATION
SELF-ADHERING JACKETS (SAJ):
Install according to manufacturer's recommendations. Cut allowing minimum 4" overlap on ends and 6" on longitudinal joints. Align parallel to surface. Remove release paper and press flat to surface to avoid wrinkles. Rub entire surface for full adhesion and sealing at joint overlaps. On exterior applications, provide a bead of compatible caulk along exposed edges.

Piping with self-adhering (SAJ) jackets shall have elbows, fittings, valves and butt joints wrapped with 2 layers of vapor retarding tape. Piping with a PVC jacket (PFJ) installed over the self-adhering (SAJ) jacket may be provided with a single, lapped layer of vapor retarding tape for elbows, fittings and valves under the PVC jacket. Vapor retarding tape shall be compatible with the jacket material used.

VAPOR RETARDING JACKETS (VRJ):
Piping with vapor retarding (VRJ) jackets shall have elbows, fittings, valves and butt joints wrapped with 2 layers of vapor retarding tape. Piping with a PVC jacket (PFJ) installed over the vapor retarding (VRJ) jackets may be provided with a single, lapped layer of vapor retarding tape for elbows, fittings and valves under the PVC jacket. Vapor retarding tape shall be compatible with the jacket material used.

PVC FITTING COVERS AND JACKETS (PFJ):
Lap seams and joints a minimum of 2 inches and continuously seal PVC with welding solvent recommended by jacket manufacturer. Lap slip joint ends 4" without fasteners where required to absorb expansion and contraction. For sections where vapor barrier is not required and jacket requires routine removal, tack fasteners may be used. Secure PVC fitting covers with tack fasteners. For systems requiring a vapor barrier, apply a 1-1/2" band of mastic over ends, throat, seams and penetrations.

PROTECTIVE METAL JACKET (PMJ):
Lap seams a minimum of 2 inches. Secure with metal bands for end to end joints, and rivets or sheet metal screws for longitudinal joints. Rivets, screws, and bands to be constructed of the same material as the jacket. Locate seams on bottom for exterior applications.

FABRIC REINFORCED MASTIC JACKETS (FMJ):
Glass fiber fabric shall be fitted without wrinkles. Glass fiber fabric shall be sized immediately upon application with lagging adhesive and shall be capable of drying within 6 hrs. Apply adhesive and coating in accordance to manufacturer's recommendations. All seams shall overlap not less than 2".

PIPING, VALVE, AND FITTING INSULATION
GENERAL:
Install insulation with butt joints and longitudinal seams closed tightly. Provide minimum 2" lap on jacket seams and 2" tape on butt joints, firmly cemented with lap adhesive unless otherwise noted. Additionally secure with staples along seams and butt joints. Coat staples, longitudinal and transverse seams with vapor barrier mastic on systems requiring vapor barrier.

Install insulation continuous through pipe hangers and supports with hangers and supports on the exterior of insulation. Where a vapor barrier is not required or where roller hangers are not being used, hangers and supports may be attached directly to piping with insulation completely covering hanger or support and jacket sealed at support rod penetration. Where riser clamps are required to be attached directly to piping requiring vapor barrier, extend insulation and vapor barrier jacketing/coating around riser clamp.

Fully insulate all reheat coil piping, fittings and valves (with the exception of unions) up to coil connection to prevent condensation when coil is inactive during cooling season. Provide a vapor proof seal between the pipe insulation and the insulated coil casing.

INSULATION INSERTS AND PIPE SHIELDS:
Provide pipe shields at all hanger and support locations. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Quantity and placement of inserts shall be according to the manufacturer's installation instructions, however the inserts shall be no less than 12" in length. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required for system.

Provide insulation inserts and pipe shields at all hanger and support locations. Inserts may be omitted on 3/4" and smaller copper piping provided 12" long 22 gauge pipe shields are used.

FITTINGS AND VALVES:
Fittings, valves, unions, flanges, couplings and specialties may be insulated with factory molded or built up insulation of the same thickness as adjoining insulation. Where the ambient temperature exceeds 150 degrees F, cover insulation with fabric reinforcing and mastic. Where the ambient temperatures do not exceed 150 degrees, furnish and install PVC fitting covers.

MINERAL FIBER:
Secure each 3' section with three stainless steel bands or five 16 gauge stainless steel or annealed copper tie wires evenly spaced and at ends. Twist wire ends, snip off excess and turn ends over into insulation. Stagger joints where more than one layer is used.

ELASTOMERIC AND POLYOLEFIN:
Where practical, slip insulation on piping during pipe installation when pipe ends are open. Miter cut fittings allowing sufficient length to prevent stretching. Completely seal seams and joints for vapor tight installation. For elastomeric insulation, apply full bed of adhesive to both surfaces. For polyeolefin, seal factory preglued seams with roller and field seams and joints with full bed of hot melt polyolefin glue to both surfaces. Cover elastomeric insulation on systems operating below 40 degrees F with vapor barrier mastic.

PIPE INSULATION SCHEDULE:
Provide insulation on new and existing remodeled piping as indicated in the following schedule:

Service	**Insulation**	**Jacket**	**Insulation Thickness by Pipe Size**				
			≤ 1-1/4"	**1-1/2"**	**2" to <4"**	**4" to 6"**	**8" and larger**
Refrigerant Suction							
>40°F	Elast./Polyol	None	0.5"	1"	1.5"	1.5"	1.5"
40°F to 20°F	Elast./Polyol	None	1"	1.5"	1.5"	1.5"	1.5"

For systems with fluid temperatures 65° F or less, furnish and install removable elastomeric insulation covers, plugs or caps for all mechanical equipment and devices that require access by balancing contractors or service and maintenance personnel.

Examples include but are not limited to: flow sensing devices, circuit setters, manual ball valve air vents, drain valves, blowdown valves, pressure/temperature test plugs, grease fittings, pump bearing caps, equipment labels, etc. Covers shall be tight fitting to ensure a complete vapor barrier.

DUCT INSULATION
GENERAL:
Secure flexible duct insulation on sides and bottom of ductwork over 24" wide and all rigid duct insulation with weld pins. Space fasteners 18” on center or less as required to prevent sagging.

Secure rigid board insulation to ductwork with weld pins. Apply insulation with joints firmly butted as close as possible to the equipment surface. Pins shall be located a maximum of 3” from each edge and spaced no greater than 12” on center.

Install weld pins without damage to the interior galvanized surface of the duct. Clip pins back to washer and cover penetrations with tape of same material as jacket. Firmly butt seams and joints and cover with 4” tape of same material as jacket. Seal tape with plastic applicator and secure with staples. All joints, seams, edges and penetrations to be fully vapor sealed.

Stop and point insulation around access doors and damper operators to allow operation without disturbing insulation or jacket material.

External supply duct insulation is not required where ductwork contains continuous 1” acoustical liner. Provide 4” overlap of external insulation over ends of acoustically lined sections.

Where insulated ductwork is supported by trapeze hangers, the insulation shall be installed continuous through the hangers. Drop the supporting channels required to facilitate the installation of the insulation. Where rigid board or flexible insulation is specified, install high density inserts to prevent the weight of the ductwork from crushing the insulation.

Where insulated low temperature (below 45ºF) ductwork is supported by steel metal straps or wire ropes that are secured directly to the duct, the straps or ropes shall be completely covered with insulation and sealed to provide a complete vapor barrier.

Where insulated duct risers are supported by steel channels secured directly to the duct, extend the insulation and vapor barrier jacketing to encapsulate the support channels.

Where ductwork exposed to the weather is insulated with any product other than fluid-applied ductwork insulation, the top surface of the insulation shall be sloped a minimum of ¼” per foot to eliminate ponding and create positive drainage off of insulation. Refer to fluid-applied ductwork insulation section below for slope requirements.

DUCTWORK PROTECTIVE COVERINGS:
In addition to the jackets specified in the duct insulation schedule below the following protective coverings are required:

DUCT INSULATION SCHEDULE:
Provide duct insulation on new and existing remodeled ductwork in the following schedule:

Service	Insulation Type	Jacket	Insulation Thickness
Outside air ducts	Rigid Fiberglass	FSJ	2"
Mixed air ducts	Rigid Fiberglass	FSJ	2"
Exposed supply ducts*	Rigid Fiberglass	FSJ	2"
Concealed supply ducts	Flexible Fiberglass	FSJ	1-1/2"
Exhaust and relief ducts downstream of motorized backdraft dampers	Rigid Fiberglass	FSJ	2"
All ducts exposed to weather	Ext. Polystyrene Fluid-Applied**	SAJ	3"

*Exposed supply branch ducts located in the space they are serving do not require insulation. Exposed supply main ducts running through spaces they serve shall be insulated as exposed supply ducts scheduled above.

END OF SECTION 23 07 00

SECTION 232300 – REFRIGERANT PIPING

PART 1 - GENERAL

SCOPE
This section contains specifications for all Refrigerant piping for this project.

RELATED WORK
Section 230529 - Hangers and Supports for HVAC Piping and Equipment
Section 230700 - HVAC Insulation

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

ANSI B16.22	Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings
ASTM B88	Seamless Copper Water Tube
ASTM B280	Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
ASHRAE 15	Safety Code for mechanical Refrigeration

SHOP DRAWINGS
Refer to Section 013300 Submittals.

Contractor shall submit schedule indicating the ASTM specification number of the pipe being proposed along with its type and grade and sufficient information to indicate the type and rating of fittings for each service.

COPPER TUBE:
Statement from manufacturer on his letterhead that the pipe furnished meets the ASTM specification contained in this section.

QUALITY ASSURANCE
Order all copper refrigeration tube with each shipping unit marked with the purchase order number, metal or alloy designation, temper, size, and name of supplier; with soft straight lengths or coils identified with a tag indicating that the product was manufactured in accordance to ASTM B280; and with each hard temper straight length identified throughout its length by a blue colored marking not less than 3/16 inch in height and a legend at intervals of not greater than three feet that includes the designation "ACR" and pipe outside diameter.

Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the Owner.

DELIVERY, STORAGE, AND HANDLING
Promptly inspect shipments to insure that the material is undamaged and complies with specifications.

Cover pipe to eliminate rust and corrosion while allowing sufficient ventilation to avoid condensation. Do not store materials directly on grade. Protect pipe, tube, and fitting ends so they are not damaged. Where end caps are provided or specified, take precautions so the caps remain in place. If end caps are not present on tube bearing the "ACR" designation, clean and re-cap in accordance to ASTM B280. Protect fittings, flanges, and unions by storage inside or by durable, waterproof, above ground packaging.

Offsite storage agreements will not relieve the contractor from using proper storage techniques.

Storage and protection methods must allow inspection to verify products.

DESIGN CRITERIA
Use only new material, free of defects and scale, and meeting the latest revision of ASTM specifications as listed in this specification.

Where ASTM B88, type L hard temper copper tubing is specified, ASTM B88, type K hard temper copper tubing may be substituted at Contractor's option.

PART 2 - PRODUCTS

REFRIGERANT PIPING
ASTM B88 type L hard drawn copper tube, cleaned and capped in accordance to ASTM B280, and marked "ACR", with ANSI B16.22 wrought copper or forged brass solder-type fittings.

REFRIGERANT PIPING ACCESSORIES
Provide all refrigerant piping specialties with a maximum working pressure of full vacuum to 450 psig and a maximum working temperature of 225 deg F. For systems using R-410A, provide all refrigerant piping specialties with a maximum working pressure of full vacuum to 850 psig and a maximum working temperature of 225 deg F.

Flexible pipe connectors: Double braided bronze hose flexible pipe connectors with solder end connections.

Filter Dryers: For circuits 15 tons and over provide angle pattern filter dryers with replaceable core. For circuits below 15 tons provide straight pattern filter dryers without replaceable core.

Sight glasses: Two piece brass construction with solder end connections. Include color indicator for sensing moisture.

Solenoid Valves: Two way normally closed with two piece brass body, full port, stainless steel plug, stainless steel spring, teflon diaphragm and solder end connections. Provide replaceable coil assembly.

Hot Gas Bypass Valves: Provide with integral solenoid valve, external equalizer connection and adjustable pilot assembly.

Thermostatic Expansion Valves: Brass body, bronze disc, neoprene seat, bronze bonnet, stainless steel spring and solder end connections.

Charging Valves: Provide ¼" SAE brass male flare access ports with finger tight, quick seal caps. Provide 2-inch long copper extension sections.

Check valves: Spring loaded type with bronze body, bronze disc, neoprene seat, bronze bonnet, stainless steel spring and solder end connections.

PART 3 - EXECUTION

PREPARATION

Remove all foreign material from interior and exterior of pipe and fittings.

ERECTION

Install all piping parallel to building walls and ceilings and at heights which do not obstruct any portion of a window, doorway, stairway, or passageway. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, door and window openings, or other architectural details before installing piping.

Install all valves and piping specialties, including items furnished by others, as specified and/or detailed. Make connections to all equipment installed by others where that equipment requires the piping services indicated in this section.

REFRIGERANT PIPING

Refrigeration piping to be installed by firms who are experienced in installation of such piping and in accordance to the requirements of the Wisconsin Administrative Code Section ILHR 45.

All solder joints to be ASTM Grade 4 or 5 and have a melting point of approximately 1250 degrees F. Solder impurities shall not exceed 0.15%. Tubing to be new and delivered to the job site with the original mill end caps in place. Clean and polish all joints before soldering. Avoid prolonged heating and burning during soldering. Purge all lines with nitrogen during soldering. Provide manual shut-off and check valves as required.

No refrigerant is to be vented directly to the atmosphere except that which may escape through leaks in the system during leak testing. During evacuation procedures, use equipment designed to recover and allow recycling of the refrigerant.

Leak test the system by charging the system to a pressure of 10 psig with an HFC refrigerant, with the compressor suction and discharge valves closed and with all other system valves open. Increase pressure to 300 psig with dry nitrogen. Rap all joints with a mallet and check for leaks with an electric leak detector having a certified sensitivity of at least one ounce per year. Seal any leaks that may be found and retest.

After completion of the leak test, evacuate the system with a vacuum pump to an absolute pressure not exceeding 1500 microns while the system ambient temperature is above 60°F. Break the vacuum to 2 psig with the refrigerant to be used in the system. Repeat the evacuation process, again breaking the vacuum with refrigerant. Install a drier of the required size in the liquid line, open the compressor suction and discharge valves, and evacuate to an absolute pressure not exceeding 500 microns. Leave the vacuum pump running for not less than two hours without interruption. Raise the system pressure to 2 psig with refrigerant and remove the vacuum pump.

Charge refrigerant directly from original drums through a combination filter-drier. Each drier may be used for a maximum of three cylinders of refrigerant and then must be replaced with a fresh drier. Charge the system by means of a charging fitting in the liquid line. Weigh the refrigerant drum before charging so that an accurate record can be kept of the weight of refrigerant put in the system. If refrigerant is added to the system through the suction side of the compressor, charge in vapor form only.

REFRIGERANT PIPING ACCESSORIES

Install accessories in accordance to the manufacturer’s written instructions and recommendations.

END OF SECTION 232300

SECTION 233100 – HVAC DUCTS AND CASINGS

PART 1 - GENERAL

SCOPE
This section includes specifications for all duct systems used on this project. Included are the following topics:

RELATED WORK
Section 230593 - Testing, Adjusting, and Balancing for HVAC

REFERENCE
Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS

ANSI SS-EN 485-2	Aluminum and Aluminum Alloys-Sheet, Strip and Plate-Part 2: Mechanical Properties
ASTM B209	Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM A90	Test Method for Weight of Coating on Zinc-Coated (Galvanized) Iron or Steel Articles
ASTM A167	Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A623	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
ASTM A527	Specification for General Requirements for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Lock-Forming Quality
ASTM 924	Standard Specification for General Requirements for Sheet Steel, Metallic-coated by the Hot-dip Method
ASTM C 1071	Specification for Fibrous Glass Duct Lining Insulation
ASTM C 411	Test Method for Hot Surface Performance of High Temperature Thermal Insulation
ASTM E 84	Test Method for Surface Burning Characteristics of Building Materials
ASTM C 1338	Test Method for Determining Fungal Resistance of Insulation Materials and Facings
ASTM G 21	Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
ASTM C 916	Standard Specification for Adhesives for Duct Thermal Insulation NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems

UL 181	Standard for Safety for Factory Made Air Ducts and Air Connectors.
NAIMA	Fibrous Glass Duct Liner Standard

QUALITY ASSURANCE
Refer to Section 012500 Substitution Procedures.

SHOP DRAWINGS
Refer to Section 013300 Submittals.

Include manufacturer's data and/or Contractor data for the following:

- Fabrication and installation drawings.
- Schedule of duct systems including material of construction, gauge, pressure class, system class, method of reinforcement, joint construction, fitting construction, and support methods, all with details as appropriate.
- Duct sealant and gasket material.
- Duct liner including data on thermal conductivity, air friction correction factor, and limitation on temperature and velocity.

DESIGN CRITERIA
Construct all ductwork to be free from vibration, chatter, objectionable pulsations and leakage under specified operating conditions.

Use material, weight, thickness, gauge, construction and installation methods as outlined in the following SMACNA publications, unless noted otherwise:

- HVAC Duct Construction Standards, Metal and Flexible, 3rd Edition, 2005
- HVAC Air Duct Leakage Test Manual, 1st Edition, 1985
- HVAC Systems - Duct Design, 4th Edition, 2006
- Rectangular Industrial Duct Construction Standard, 2nd Edition, 2004
- Round Industrial Duct Construction Standards, 2nd Edition, 1999
- Thermoplastic Duct (PVC) Construction Manual, 2nd Edition, 1995

Use products which conform to NFPA 90A, possessing a flame spread rating of not over 25 and a smoke developed rating no higher than 50.

DELIVERY, STORAGE AND HANDLING
Promptly inspect shipments to ensure that Ductwork is undamaged and complies with the specification.

Protect Ductwork against damage.

Protect Ductwork by storing inside or by durable, waterproof, above ground packaging. Do not store material on grade. Protect Ductwork from dirt, dust, construction debris and foreign material. Where end caps/packaging are provided, take precautions so caps/packaging remain in place and free from damage.

Offsite storage agreements do not relieve the contractor from using proper storage techniques.

Storage and protection methods must allow inspection to verify products.

PART 2 - PRODUCTS

GENERAL

All sheet metal used for construction of duct shall be 24 gauge or heavier except for round and spiral ductwork and spiral duct take-offs 12" and below may be 26 gauge where allowed in SMACNA HVAC Duct Construction Standards, Metal and Flexible, 3rd Edition, 2005.

Duct sizes indicated on plans are net inside dimensions; where duct liner is specified, dimensions are net, inside of liner.

DUCTWORK PRESSURE CLASS

Minimum acceptable duct pressure class, for all ductwork except transfer ductwork, is 2 inch W.G. positive or negative, depending on the application. Transfer ductwork minimum acceptable duct pressure class is 1 inch W.G. positive or negative, depending on the application. Duct system pressure classes not indicated on the drawings to be as follows:

Supply duct upstream of VAV boxes	_____ in. calc. S.P.	____2_ in. pressure class
Supply duct downstream of VAV terminals	_____ in. calc. S.P.	____2_ in. pressure class
Transfer ducts	_____ in. calc. S.P.	____2_ in. pressure class
Exhaust ducts	_____ in. calc. S.P.	____2_ in. pressure class
Return ducts	_____ in. calc. S.P.	____2_ in. pressure class
Relief ducts	_____ in. calc. S.P.	____2_ in. pressure class

MATERIALS

GALVANIZED STEEL SHEET:

Use ASTM A 653 galvanized steel sheet of lock forming quality. Galvanized coating to be 1.25 ounces per square foot, both sides of sheet, G90 in accordance to ASTM A90. Provide "Paint Grip" finish or galvanneal sheetmetal for ductwork that will be painted.

LOW PRESSURE DUCTWORK (MAXIMUM 2 INCH PRESSURE CLASS)

Fabricate and install ductwork in sizes indicated on the drawings and in accordance to SMACNA recommendations, except as modified below.

Construct so that all interior surfaces are smooth. Use slip and drive or flanged and bolted construction when fabricating rectangular ductwork. Use spiral lock seam construction when fabricating round spiral ductwork. Sheet metal screws may be used on duct hangers, transverse joints and other SMACNA approved locations if the screw does not extend more than 1/2 inch into the duct.

Use elbows and tees with a center line radius to width or diameter ratio of 1.5 wherever space permits. When a shorter radius must be used due to limited space, install single wall sheet metal splitter vanes in accordance to SMACNA publications, Type RE 3. Where space will not allow and the C value of the radius elbow, as given in SMACNA publications, exceeds 0.31, use rectangular elbows with turning vanes as specified in Section 233300. Square throat-radius heel elbows will not be acceptable. Straight taps or bullhead tees are not acceptable.

Where rectangular elbows are used, provide turning vanes in accordance to Section 233100.

Provide expanded take-offs or 45 degree entry fittings for branch duct connections with branch ductwork airflow velocities greater than 700 fpm. Square edge 90-degree take-off fittings or straight taps will not be accepted.

Button punch snaplock construction will not be accepted on aluminum ductwork.

Round ducts may be substituted for rectangular ducts if sized in accordance to ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission of the Architect/Engineer.

Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

DUCT SEALANT
Manufacturer: 3M 800, 3M 900, H.B. Fuller/Foster, Hardcast, Hardcast Peal & Seal, Lockformer cold sealant, Mon-Eco Industries, United Sheet Metal, or approved equal. Silicone sealants are not allowed in any type of ductwork installation.

Install sealants in strict accordance with manufacturer's recommendations, paying special attention to temperature limitations. Allow sealant to fully cure before pressure testing of ductwork, or before startup of air handling systems.

GASKETS
2 INCH PRESSURE CLASS AND LOWER:
Soft neoprene or butyl gaskets in combination with duct sealant for flanged joints.

PART 3 - EXECUTION

INSTALLATION

Verify dimensions at the site, making field measurements and drawings necessary for fabrication and erection. Check plans showing work of other trades and consult with Architect in the event of any interference.

Make allowances for beams, pipes or other obstructions in building construction and for work of other contractors. Transform, divide or offset ducts as required, in accordance to SMACNA HVAC Duct Construction Standards, Figure 4-7, except do not reduce duct to less than six inches in any dimension and do not exceed an 8:1 aspect ratio. Where it is necessary to take pipes or similar obstructions through ducts, construct easement as indicated in SMACNA HVAC Duct Construction Standards, Figure 4-8, Fig. E. In all cases, seal to prevent air leakage. Pipes or similar obstructions may not pass through high pressure or fume exhaust ductwork.

Test openings for test and balance work will be provided under Section 230593.

Provide frames constructed of angles or channels for coils, filters, dampers or other devices installed in duct systems, and make all connections to such equipment including equipment furnished by others. Secure frames with gaskets and screws or nut, bolts and washers.

Install duct to pitch toward outside air intakes and drain to outside of building. Solder or seal seams to form watertight joints.

Where two different metal ducts meet, the joint shall be installed in such a manner that metal ducts do not contact each other by using proper seal or compound.

Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

Provide adequate access to ductwork for cleaning purposes.

Provide temporary capping of ductwork openings to prevent entry of dirt, dust and foreign material.

Protect diffusers, registers and grilles with plastic wrap or some other approved form of protection to maintain dirt and dust free and to prevent entry of dirt, dust and foreign material into the Ductwork.

During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

DUCTWORK SUPPORT
Support ductwork in accordance to SMACNA HVAC Duct Construction Standards, Figure 5-5, except supporting ductwork with secure wire method is not allowed.

Support with 3/32 inch, 7 x 7, stainless steel air-craft cable, with matching fastener rated for 50% of actual load, will be allowed on round ductwork under 12 inches if installed as detailed, with cable double looped on duct and at point of support.

LOW PRESSURE DUCT (MAXIMUM 2 INCH PRESSURE CLASS)
Seal all duct, with the exception of transfer ducts, in accordance to SMACNA seal class "A"; all seams, joints, and penetrations shall be sealed.

Install a manual balancing damper in each branch duct and for each diffuser or grille. The use of splitter dampers, extractors, or grille face dampers will not be accepted for balancing dampers.

Hangers must be wrapped around bottom edge of duct and securely fastened to duct with sheetmetal screws or pop rivets. Trapeze hangers may be used at contractor's option.

CLEANING
Remove all dirt and foreign matter from the entire duct system and clean diffusers, registers, grilles and the inside of air-handling units before operating fans.

Clean duct systems with high power vacuum machines where systems have been used for temporary heat, air-conditioning, or ventilation purposes during construction. Protect equipment that may be harmed by excessive dirt with filters, or bypass during cleaning.

END OF SECTION 233100

SECTION 233400 – HVAC FANS

PART 1 - GENERAL

SCOPE
This section includes specifications for fans that are not an integral part of a manufactured device.

RELATED WORK
Section 230529 - Hangers and Supports for HVAC Piping and Equipment
Section 230513 - Common Motor Requirements for HVAC Equipment

REFERENCE
Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS
AMCA 203 AMCA Fan Application Manual - Troubleshooting
AMCA 300 Reverberant Room Method for Sound Testing of Fans
NFPA 90A Standard for the Installation of Air Conditioning and Ventilating Systems

QUALITY ASSURANCE
Refer to Section 012500 Substitution Procedures.

SHOP DRAWINGS
Refer to 013300 Submittals.

Include dimensions, capacities, fan curves, materials of construction, ratings, weights, motors and drives, sound power levels, appropriate identification and vibration isolation for all equipment. Sound power levels to be based on tests performed in accordance to AMCA Standard 300.

Submit color selection charts for equipment where applicable.

Fan curves shall indicate the relationship of CFM to static or total pressure for various fan speeds. Brake horsepower, recommended selection range, and limits of operation are to also be indicated on the curves. Indicate operating point on the fan curves at design air quantity and indicate the manufacturer's recommended drive loss factor for the specific application. Tabular fan performance data is not acceptable.

For variable air volume application, include data which indicates the effect of capacity control devices, such as inlet vanes, on performance.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

DESIGN CRITERIA

Tested and certify all fans in accordance to the applicable AMCA test code.

Each fan and motor combination shall be capable of delivering 110% of air quantity scheduled at scheduled static pressure. The motor furnished with the fan shall not operate into the motor service factor when operating under these conditions.

Consider drive efficiency in motor selection according to manufacturer's published recommendation or according to AMCA Publication 203, Appendix L.

Where inlet and outlet ductwork at any fan is changed from that shown on the drawings, provide any motor, drive and/or wiring changes required due to increased static pressure or baffling necessary to prevent uneven airflow or improve mixing.

All internal insulation and other components exposed to the airstream are to meet the flame spread and smoke ratings contained in NFPA 90A.

All roof mounted equipment to be provided with curbs or equipment stands in accordance to specification in Section 230529.

PART 2 - PRODUCTS

GENERAL

Use fan size, class, type, arrangement, and capacity as scheduled.

Furnish complete with motors, wheels, drive assemblies, bearings, vibration isolation devices, and accessories required for specified performance and proper operation. All single phase motors to have inherent thermal overload protection.

Provide variable pitch sheaves for drives 3 hp and smaller, fixed pitch sheaves for drives 5 hp and larger. Design all drives for 150% of motor rating.

Use OSHA approved belt guards that totally enclose the entire drive. Construct guards of expanded metal to allow for ventilation; provide tachometer openings at shaft locations.

Statically and dynamically balance all fans so they operate without objectionable noise or vibration.

Use AMCA Type A spark resistant construction for all fans handling flammable or explosive vapors.

All fans handling grease laden vapors shall meet the requirements of UL 762 and NFPA 96.

Provide a corrosion resistant coating on all surfaces exposed to fume and other corrosive exhaust air. Coating to be as scheduled.

CENTRIFUGAL FANS
Manufacturers: PennBarry, Peerless, Buffalo, Carrier, Champion, Chicago Blower, Greenheck, New York Blower, Trane, Twin City, Cook, or approved equal.

Construct housing of welded steel with angle iron frame. Use spun or die formed inlet cones to provide a streamlined flow into the wheel. Use airfoil blades welded to spun wheel cones unless otherwise indicated. Shafts shall be AISI C 1045 hot rolled steel turned, ground and polished. Shaft shall be sized for at least 125% of the fans maximum cataloged RPM.

Bearings to be self-aligning grease packed pillow block type with grease seal and external grease fittings with a minimum L50 life of 200,000 hours at the maximum cataloged operating speed. Provide each fan housing with a capped drain connection and bolted and gasketed access door for inspection of fan wheel. Unless a special coating is scheduled, paint fans with a prime coat after metal cleaning and surface preparation; apply a second coat of paint to all exterior surfaces.

Fans shall bear the AMCA Certified Ratings Seal for Sound and Air Performance.

IN-LINE CENTRIFUGAL FANS
Manufacturers: Acme, PennBarry, Cook, Greenheck, New York Blower, Peerless, Penn, Twin City, or approved equal.

Construct housing of welded steel with reinforcing to prevent distortion. Furnish with streamlined inlet cones and multiple straightening vanes following the fan wheel to minimize noise and reduce turbulence. Provide each housing with a bolted and gasketed access door for inspection of drive and fan wheel. Use non-overloading airfoil blade fans welded to the wheel cones. Isolate belt drives from airstream with a belt tube. Externally mount motors on an adjustable base. Bearings to be grease lubricated, self-aligning ball bearing type with grease seal and external grease fitting. Unless a special coating is scheduled, paint fans with a prime coat after metal cleaning and surface preparation. Apply a second coat of paint to all exterior surfaces.

Design all vertically mounted fans to withstand the vertical thrust loads.

Provide variable inlet vanes for fans as scheduled. Vane bearings shall have grease fittings extended to an accessible location.

Provide one inch galvanized mesh inlet screens for fans without inlet ductwork.

CABINET FANS
Manufacturers: Buffalo, Carrier, McQuay, Trane, York, or approved equal.

Use double width, double inlet airfoil centrifugal fans unless scheduled otherwise. Construct air tight casing and frame of galvanized or rust inhibited prime coated steel with removable panels to allow access to internal parts. Thermally insulate casing with not less than one inch of glass fiber or other closed cell insulation secured to the casing with waterproof adhesive and/or stic clips; coat the exposed surface to minimize erosion. Bearings to be self-aligning grease packed pillow block type with grease seal; they may be mounted internally or externally but internally mounted bearings must be provided with extended grease lines to a point outside the unit.

Provide filter section or a filter rack within fan cabinet suitable for installation of panel filters as scheduled or specified.

Provide variable inlet vanes with bearing grease fittings extended to an accessible location for fans as scheduled.

CEILING EXHAUST FANS
Carnes, Greenheck, Penn, Jenn-Air, Cook, ACME, or approved equal.

Centrifugal blower wheel, steel housing with acoustical lining, integral exhaust grille, adjustable mounting brackets to allow for any ceiling thickness, permanently lubricated motor, integral junction box with permanently lubricated and thermally protected motor factory wired, [24 volt electrically] [pneumatically] operated control damper with blade edge and jamb seals, and damper operator.

Provide wall, eave, or roof discharge assembly, as indicated on the drawings.

PART 3 - EXECUTION

INSTALLATION
Install as shown on the drawings, as detailed, and according to manufacturer's installation instructions. On units provided with a drain connection, reduce drain connection down to 1/2” fitting and leave open.

Contractor shall balance blade assembly of destratification fans after installation to assure stable operation.

END OF SECTION 233400

SECTION 233600 – AIR TERMINAL UNITS

PART 1 - GENERAL

SCOPE
This section includes specifications for air terminal equipment. Change over variable volume variable temperature with bypass VAV constant volume system.

RELATED WORK
Section 233100 - HVAC Ducts and Casings

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS
NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
UL 181 - Factory-Made Air Ducts and Connectors.
ARI-ADC Standard 880
ASTM E84 – Surface Burning Characteristics of Building Materials
UL 723 – Surface Burning Characteristics of Building Materials

QUALITY ASSURANCE
Refer to Section 012500 Substitution Procedures.

SHOP DRAWINGS
Refer to Section 013300 Submittals.

Contractor shall submit air terminal unit data including materials of construction, dimensions, scheduled flow rates, pressure drops, radiated and discharge sound power levels, reset volume controller data, actuator spring range and torque data.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

DESIGN CRITERIA
Select sizes, capacities, configuration, and operating characteristics as shown on the plans and/or as scheduled.

PART 2 - PRODUCTS

SUPPLY AIR TERMINAL BOXES
Units shall be single duct and pressure independent.

MANUFACTURERS:
Carrier, Trane, York or equal.

CONSTRUCTION:
Round inlet collar shall be equipped with a multi-point flow sensor that shall amplify the measured velocity pressure. Pneumatic tubing from flow sensor to differential pressure transducer shall be UL listed, fire retardant (FR) type.

TERMINAL AIR BOX/VENTURI AIR VALVE CONTROLS

DDC CONTROLS:
BUTTERFLY DAMPER TERMINAL AIR BOX
Damper actuator and differential pressure sensor for flow measurement shall be provided by the supplier of equipment manufacturer with complete integration with packaged Air Handling equipment.

PART 3 - EXECUTION

INSTALLATION
Install air terminal units as indicated on project drawings and in accordance to the manufacturer's installation instructions.

Mount air terminal boxes with a minimum 3 feet of straight ductwork upstream of inlet flow sensor for sizes 12" diameter and below. Provide a minimum of 3X the inlet diameter of straight duct upstream of the inlet flow sensor for inlet sizes above 12" diameter.

Where hot water reheat coils are provided with air terminal boxes the following two options may be used.

Field mount coil separate from box with a 12-18" section of duct between the air terminal box. The duct shall be wrapped with external insulation as indicated in specification section 23 07 00 – HVAC Insulation.

Provide at least 24" of clearance on controller side of the air terminal unit. The clearance area shall extend the full length of the supply air terminal unit and the full length (including the access door) of the exhaust/return air terminal unit

Support air terminal units from building structure using sheet metal straps or trapeze hanger with rods. Do not mount air terminal units off of adjacent ductwork or piping.

ADJUSTING
Coordinate adjustment of air terminal units with section 23 05 93 - Testing, Adjusting and Balancing.

FUNCTIONAL PERFORMANCE TESTING
Contractor is responsible for utilizing the functional performance test forms in accordance to the procedures defined for functional performance testing.

AGENCY TRAINING
All training provided for agency shall comply with the format, general content requirements and submission guideline.

END OF SECTION 233600

SECTION 233713 – DIFFUSERS, REGISTERS AND GRILLES

PART 1 - GENERAL

SCOPE
This section includes specifications for air terminal equipment.

RELATED WORK
Section 233100 - HVAC Ducts and Casings
Section 230593 - Testing, Adjusting and Balancing for HVAC

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS
NFPA 90A - Installation of Air Conditioning and Ventilation Systems.
UL 181 - Factory-Made Air Ducts and Connectors.
ARI-ADC Standard 880

QUALITY ASSURANCE
Refer to Section 012500 Substitution Procedures.

SUBMITTALS
Refer to Section 013300 Submittals.

Furnish submittal information including, but not limited to, the following:

- Manufacturer's name and model number
- Identification as referenced in the documents
- Capacities/ratings
- Materials of construction
- Sound ratings
- Dimensions
- Finish
- Color selection charts where applicable
- Manufacturer's installation instructions
- All other appropriate data

DESIGN CRITERIA
All performance data shall be based on tests conducted in accordance to Air Diffusion Council (ADC) Test Code 1062 GRD 84.

PART 2 - PRODUCTS

MANUFACTURERS

Manufacturers: Carnes, Krueger, Titus, Metal Aire, and E.H. Price, and United Sheet Metal.

Acceptable manufacturers for specific products are listed under each item.

SQUARE CEILING DIFFUSERS - PLAQUE

Titus model OMNI, Carnes series SFPA/SHPA, Price model SMDP, Metal Aire series 5750, and Krueger series PLQ/5PLQ.

Aluminum (Steel) unless otherwise indicated, louvered face furnished with frame type appropriate to installation.

Directional blow pattern as shown on the drawings and/or as scheduled.

One-piece removable square face plaque with one-piece backpan.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

SIDE-WALL REGISTERS AND GRILLES

Titus series 300 (supply) and series 350 (return/exhaust), Carnes model R series, Price model 520 (Supply) or 530 (return/exhaust), Metal Aire series V4000 or H4000, Krueger series 880.

Aluminum (Steel) unless otherwise indicated, with frame type appropriate to installation.

Double deflection type blade supply registers and supply grilles allow deflection adjustment in all direction.

Opposed blade volume control damper supply registers, operable from face.

Fixed blade (0 degree, 45 degree) core return and exhaust registers and grilles.

Opposed blade volume control damper return registers, operable from face.

Register and grille sizes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

Screw holes on surface counter sunk to accept recessed type screws.

DOOR GRILLE
Titus Series 700, Carnes Series RF or RG, Metal Aire Series DG, Price ATG/STG

Aluminum (Steel). Sight tight.

Grille sizes, frame types, and finishes as shown on drawings and/or as scheduled.

White, baked enamel finish or powder coat finish, unless otherwise indicated.

PART 3 - EXECUTION

INSTALLATION
Install grilles, registers and diffusers as shown on drawings and according to manufacturer's instructions.

Furnish diffusers with equalizing grids where it is not possible to maintain minimum 2 duct diameter straight duct into diffuser. Equalizing grids shall consist of individually adjustable vanes designed for equalizing airflow into diffuser neck and providing directional control of airflow.

Unless otherwise indicated, size ductwork drops to diffusers or grilles to match unit collar size.

Seal connections between ductwork drops and diffusers/grilles airtight.

Blank off unused portion of linear slot diffusers and linear bar diffusers and grilles.

Where diffusers, registers and grilles cannot be installed to avoid seeing inside duct, paint inside of duct with flat black paint to reduce visibility.

In clean rooms and animal holding rooms, caulk space between diffuser or grille and ceiling or wall to be air and watertight. User clear, non-hardening silicone sealant compatible with ceiling or wall surfaces. Sealant shall be resistant to microbiological growth.

END OF SECTION 233713

SECTION 234100 – PARTICULATE AIR FILTRATION

PART 1 - GENERAL

SCOPE
This section includes specifications for air system filters.

RELATED WORK
Section 230700 - HVAC Insulation

REFERENCE
Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS
ASHRAE Standard 52
UL 181 – Standard for Factory-Made Air Ducts and Air Connectors
UL 586 – Standard for High Efficiency Particulate Air Filter Units
UL 900 – Standard for Air Filter Units

QUALITY ASSURANCE
Refer to Section 012500 Substitution Procedures.

SHOP DRAWINGS
Refer to Section 013300, Submittals.

Include data concerning dimensions, materials, efficiencies, installation instructions and appropriate identification.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

DESIGN CRITERIA
Use UL Class 1 or Class 2 filters unless noted otherwise.(Reference applicable UL standard referenced)

Efficiencies indicated in this section are based on ASHRAE Standard 52.

Fan motors have been selected to operate against the resistance of dirty filters as specified in this section.

PART 2 - PRODUCTS

MANUFACTURERS
American Air Filter, Barnebey-Cheney, Cambridge, Continental, Flanders, Camil-Farr, Mine Safety Appliances, Research Products, BLC Industries or approved equal.

PANEL FILTERS

MERV 7 FILTERS
Furnish a side access filter housing or holding frame as required. Filter tracks shall be constructed to provide a minimum clearance of 2 inches between the pre-filter and final-filter media to facilitate the installation of static pressure tips.

HOUSINGS FOR MERV 7 FILTERS
Housing or holding frame to be of the same manufacturer as filter media or provided by the air handling unit manufacturer. Contractor fabricated housings or filter racks will not be accepted. Casing and tracks constructed of galvanized or enameled steel or aluminum. Provide access to the media tracks from outside the casing so media and be readily changed. Filter tracks shall be constructed to provide a minimum clearance of 2 inches between the pre-filter and final-filter media to facilitate the installation of static pressure tips.

PART 3 - EXECUTION

INSTALLATION
Where air handling equipment is to be used for temporary heating or ventilation of a facility, do not operate the equipment until specified filter media has been installed. Contractor shall be responsible for maintaining the cleanliness of air handling apparatus and air distribution systems during construction through regular inspection and changing of filter media throughout the construction period.

Where air handling apparatus is used during the construction period, install new filter media prior to start of air balancing. Additionally, deliver one new set of media to the owner prior to substantial completion.

Install units as shown on drawings and details according to manufacturer's instructions.

Reinforce filter holding frames per manufacturer's instructions.

Maintain necessary clearance for changing filters.

END OF SECTION 234100

SECTION 237433 – DEDICATED OUTDOOR AIR UNIT AHU-6

PART 1 - GENERAL

SUMMARY
Section includes factory-packaged units capable of supplying up to 100 percent outdoor air and providing cooling and heating.

ACTION SUBMITTALS
Product Data: For each type of product.
Shop Drawings: Include plans, elevations, sections, and attachment details.

CLOSEOUT SUBMITTALS
Operation and maintenance data.

WARRANTY
Special Warranty: Manufacturer agrees to replace components of units that fail in materials or workmanship within specified warranty period.
Warranty Period for Compressors: Five years from date of Substantial Completion.
Warranty Period for Heat Exchangers: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

MANUFACTURERS
Manufacturers: Subject to compliance with requirements, provide products by one of the following:

Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings Trane or comparable product by one of the following:
Trane, Carrier. or McQuay, or approved equal.

PERFORMANCE REQUIREMENTS
General Fabrication Requirements: Comply with requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Start-up." either side of normal.

Cabinet Thermal Performance:
Maximum Overall U-Value: Comply with requirements in ASHRAE/IESNA 90.1.

Cabinet Surface Condensation:
Cabinet shall have additional insulation and vapor seals if required to prevent condensation on the interior and exterior of the cabinet.

Portions of cabinet located downstream from the cooling coil shall have a thermal break at each thermal bridge between the exterior and interior casing to prevent condensation

from occurring on the interior and exterior surfaces. The thermal break shall not compromise the structural integrity of the cabinet.

Electrical components, devices, and accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

Overall Unit Electrical Characteristics:
Volts: 208
Phase: Three
Hertz: 60

CABINET
Construction: Single or double wall.
Exterior Casing Material: Galvanized steel with paint finish.
Interior Casing Material: Galvanized steel.
Lifting and Handling Provisions: Factory-installed shipping skids and lifting lugs.
Base Rails: Galvanized-steel rails for mounting on roof curb or pad as indicated.
Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
Service Doors: Hinged access doors with gaskets. Material and construction of doors shall match material and construction of cabinet in which doors are installed.
Roof: Standing seam or membrane; sloped to drain water.
Floor: Reinforced, metal surface; reinforced to limit deflection when walked on by service personnel. Insulation shall be below metal walking surface.

Cabinet Insulation:
Type: Fibrous-glass duct lining complying with ASTM C 1071, Type II
Thickness: 1 inches.
Insulation Adhesive: Comply with ASTM C 916, Type I.
Mechanical Fasteners: Suitable for adhesive, mechanical, or welding attachment to casing without damaging liner and without causing air leakage when applied as recommended by manufacturer.

Condensate Drain Pans:
Shape: Rectangular, with 2 percent slope in at least two planes to direct water toward drain connection.
Size: Large enough to collect condensate from cooling coils including coil piping connections, coil headers, and return bends.
Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
Depth: A minimum of 2 inches (50 mm) deep.
Configuration: Single wall.
Configuration: Double wall, with space between walls filled with foam insulation and moisture-tight seal.
Material: Galvanized-steel sheet with asphaltic waterproofing compound coating on pan top surface.
Material: Stainless-steel sheet.

Drain Connection:
Located on one end of pan, at lowest point of pan.
Terminated with threaded nipple.
Minimum Connection Size: NPS 1 (DN 25).
Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.
Surfaces in Contact with Airstream: Comply with requirements in ASHRAE 62.1 for resistance to mold and erosion.
Roof/Grade Curb: Full-perimeter curb of sheet metal, minimum 12 inches (300 mm) high, with wood nailer, neoprene sealing strip, and welded Z-bar flashing.
Comply with requirements in "The NRCA Roofing Manual."

SUPPLY FAN
Forward-Curved Fan Type: Centrifugal; statically and dynamically balanced.
Bearings: Self-aligning, permanently lubricated ball bearings.
Efficiency: Premium efficient.

COOLING COILS
Capacity Ratings: Comply with ASHRAE 33 and ARI 410 and coil bearing the ARI label.
Coil Casing Material: Manufacturer's standard material.
Fin Material: Aluminum.
Fin and Tube Joints: Mechanical bond.
Leak Test: Coils shall be leak tested with air underwater.
Refrigerant Coil Suction and Distributor Header Materials: Seamless copper tube with brazed joints.
Coating: Phenolic epoxy corrosion-protection coating after assembly.

REFRIGERATION SYSTEM
Comply with requirements in ASHRAE 15, "Safety Standard for Refrigeration Systems."
Refrigerant Charge: Factory charged with refrigerant and filled with oil.
Compressors: Scroll compressors with integral vibration isolators, internal overcurrent and overtemperature protection, internal pressure relief, and crankcase heater.
Refrigerant: R-410A.
Classified as Safety Group A1 according to ASHRAE 34.
Provide unit with operating charge of refrigerant.
Refrigeration System Specialties:
Expansion valve with replaceable thermostatic element.
Refrigerant dryer.
High-pressure switch.
Low-pressure switch.
Thermostat for coil freeze-up protection during low ambient temperature operation or loss of air.
Brass service valves installed in discharge and liquid lines.
Condenser Fan Assembly:
Fans: Direct-drive propeller type with statically and dynamically balanced fan blades.

Fan Motors:
Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
Motor Enclosure: Totally enclosed non-ventilating (TENV) or totally enclosed air over (TEAO) enclosure.
Motor Bearings: Permanently lubricated bearings.
Fan Safety Guards: Steel with corrosion-resistant coating.
Safety Controls:
Compressor motor and condenser coil fan motor low ambient lockout.
Overcurrent protection for compressor motor.

INDIRECT-FIRED GAS FURNACE HEATING
Furnace Assembly:
Factory assembled, piped, and wired.
Comply with requirements in NFPA 54, "National Fuel Gas Code," and ANSI Z21.47, "Gas-Fired Central Furnaces."
AGA Approval: Designed and certified by and bearing label of AGA.
Burners:
Heat-Exchanger Material: Stainless steel with a minimum thermal efficiency of 80 percent.
Fuel: Natural gas.
Ignition: Electronically controlled electric spark with flame sensor.
Safety Controls:
Gas Control Valve: Two stage.
Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.

OUTDOOR-AIR INTAKE HOOD
Type: Manufacturer's standard hood or louver.

Materials: Match cabinet.

Bird Screen: Comply with requirements in ASHRAE 62.1.

Configuration: Designed to inhibit wind-driven rain and snow from entering unit.

FILTERS
Disposable Panel Filters:
Comply with NFPA 90A.
Factory-fabricated, viscous-coated, flat-panel type.
Thickness: 2 inches (50 mm).
Minimum Merv: 6, according to ASHRAE 52.2.
Media: Interlaced glass fibers sprayed with nonflammable adhesive.

ELECTRICAL POWER CONNECTIONS

General Electrical Power Connection Requirements: Factory-installed and -wired switches, motor controllers, transformers, and other necessary electrical devices shall provide a single-point field power connection to unit.

Enclosure: NEMA 250, mounted in unit with hinged access door in unit cabinet having a lock and key or padlock and key,

Wiring: Numbered and color-coded to match wiring diagram.

Wiring Location: Install factory wiring outside an enclosure in a raceway.

Power Interface: Field power interface shall be to NEMA KS 1, heavy-duty, nonfused disconnect switch.

Factory Wiring: Branch power circuit to each motor and to controls with one of the following disconnecting means:

NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.

NEMA KS 1, heavy-duty, non-fusible switch.

UL 489, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.

Factory-Mounted, Overcurrent-Protection Service: For each motor.

Transformer: Factory mounted with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.

Controls: Factory wire unit-mounted controls where indicated.

Receptacle: Factory wire unit-mounted, ground fault interrupt (GFI) duplex receptacle.

Control Relays: Auxiliary and adjustable time-delay relays.

CONTROLS

Control Wiring: Factory wire connection for controls' power supply.

Control Devices: Sensors, transmitters, relays, switches, detectors, operators, actuators, and valves shall be manufacturer's standard items to accomplish indicated control functions.

Unit-Mounted Status Panel:

Cooling/Off/Heating Controls: Control operational mode.

Damper Position: Indicate position of outdoor-air dampers in terms of percentage of outdoor air.

Status Lights:

Filter dirty.

Fan operating.

Cooling operating.

Heating operating.

Smoke alarm.

General alarm.

Digital Numeric Display:

Outdoor airflow.

Supply airflow.
Outdoor dry-bulb temperature.
Outdoor dew point temperature.
Space temperature.
Supply temperature.
Space relative humidity.
Space carbon dioxide level.01
Damper Operators:
Factory-installed electric operator for each damper assembly with one operator for each damper assembly mounted to the damper frame.
Operator capable of shutoff against fan pressure and able to operate the damper with sufficient reserve power to achieve smooth modulating action and proper speed of response at the velocity and pressure conditions to which the damper is subjected.
Maximum Operating Time: Open or close damper 90 degrees in 60 seconds.
Adjustable Stops: For both maximum and minimum positions.
Position Indicator and Graduated Scale: Factory installed on each actuator with words "OPEN" and "CLOSED," or similar identification, at travel limits.
Spring-return operator to fail-safe; either closed or open as required by application.
Operator Type: Direct coupled, designed for minimum 60,000 full-stroke cycles at rated torque.
Position feedback Signal: For remote monitoring of damper position.
Coupling: V-bolt and V-shaped, toothed cradle.
Circuitry: Electronic overload or digital rotation-sensing circuitry.
Refrigeration System Controls:
Unit-mounted enthalpy controller shall lock out refrigerant system when outdoor-air enthalpy is less than 28 Btu/lb (65 kJ/kg) of dry air or outdoor-air temperature is less than 60 deg F (15 deg C).
Furnace Controls:
intermface with VVT system controls.
Staged Burner Control: Two steps of control..
Damper Controls: Space pressure sensor modulates outdoor- and return-air dampers to maintain a positive pressure in space at a minimum of 0.05 inch wg (12.4 Pa) with respect to outdoor reference.
Integral Smoke Alarm: Smoke detector installed in return air.
DDC Temperature Control: Standalone control module for link between unit controls and DDC temperature-control system. Control module shall be compatible with control system specified Links shall include the following:
Start/stop interface relay, and relay to notify DDC temperature-control system alarm condition.
Hardware interface or additional sensors for the following:
Room temperature.
Discharge-air temperature.
Refrigeration system operating.
Furnace operating.
Constant and variable motor loads.
Cooling load.

Economizer cycles.
Air-distribution static pressure and ventilation-air volumes.

ACCESSORIES
Duplex Receptacle: Factory mounted in unit supply-fan section, with 20 amp 120 V GFI duplex receptacle and weatherproof cover.

PART 3 - EXECUTION

INSTALLATION
Comply with manufacturer's rigging and installation instructions for unloading units and moving to final locations.
Curb Support: Install roof curb on roof structure according to "The NRCA Roofing Manual."
Install and secure units on curbs and coordinate roof penetrations and flashing with roof construction.
Coordinate size, installation, and structural capacity of roof curbs, equipment supports, and roof penetrations. Coordinate size, location, and installation of unit manufacturer's roof curbs and equipment supports with roof Installer.
Restrained Curb Support: Install restrained vibration isolation roof-curb rails on roof structure according to "The NRCA Roofing Manual."
Equipment Mounting:
Install air units on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Cast-in-Place Concrete. Retain one of two subparagraphs below. Retain first for projects in seismic areas; retain second for projects not in seismic areas. Indicate vibration isolation and seismic-control device type and minimum deflection in supported equipment schedule on Drawings.
Install wall- and duct-mounted sensors furnished by manufacturer for field installation. Install control wiring and make final connections to control devices and unit control panel.
Comply with requirements for gas-fired furnace installation in NFPA 54, "National Fuel Gas Code."
Install separate devices furnished by manufacturer and not factory installed.
Install new filters at completion of equipment installation and before testing, adjusting, and balancing.

CONNECTIONS
Where installing piping adjacent to units, allow space for service and maintenance.

Gas Piping Connections:
Comply with requirements "Facility Natural-Gas Piping."
Connect gas piping to furnace, full size of gas train inlet, and connect with union, pressure regulator, and shutoff valve with sufficient clearance for burner removal and service.
Install AGA-approved flexible connectors.

Duct Connections:
Comply with requirements in "Metal Ducts."
Drawings indicate the general arrangement of ducts.

Electrical Connections: Comply with requirements for power wiring, switches, and motor controls in electrical Sections.
Install electrical devices furnished by unit manufacturer but not factory mounted.

STARTUP SERVICE
Perform startup service.
Complete installation and startup checks according to manufacturer's written instructions.
Inspect units for visible damage to furnace combustion chamber.
Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency:
Measure gas pressure at manifold.
Measure combustion-air temperature at inlet to combustion chamber.
Measure flue-gas temperature at furnace discharge.
Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
High-limit heat exchanger.
Alarms.
Inspect units for visible damage to refrigerant compressor, condenser and evaporator coils, and fans.
Start refrigeration system when outdoor-air temperature is within normal operating limits and measure and record the following:
Cooling coil leaving-air, dry- and wet-bulb temperatures.
Cooling coil entering-air, dry- and wet-bulb temperatures.
Condenser coil entering-air dry-bulb temperature.
Condenser coil leaving-air dry-bulb temperature.
Simulate maximum cooling demand and inspect the following:
Compressor refrigerant suction and hot-gas pressures.
Short-circuiting of air through outside coil or from outside coil to outdoor-air intake.
Inspect casing insulation for integrity, moisture content, and adhesion.
Verify that clearances have been provided for servicing.
Verify that controls are connected and operable.
Verify that filters are installed.
Clean coils and inspect for construction debris.
Clean furnace flue and inspect for construction debris.
Inspect operation of power vents.
Purge gas line.
Inspect and adjust vibration isolators and seismic restraints.
Verify bearing lubrication.

Clean fans and inspect fan-wheel rotation for movement in correct direction without vibration and binding.
Adjust fan belts to proper alignment and tension.
Start unit.
Inspect and record performance of interlocks and protective devices including response to smoke detectors by fan controls and fire alarm.
Operate unit for run-in period.
Calibrate controls.
Adjust and inspect high-temperature limits.
Inspect outdoor-air dampers for proper stroke.
Verify operational sequence of controls.
Measure and record the following airflows. Plot fan volumes on fan curve.
Supply-air volume.
Return-air flow.
Outdoor-air flow.
After startup, change filters, verify bearing lubrication, and adjust belt tension.
Remove and replace components that do not properly operate and repeat startup procedures as specified above.
Prepare written report of the results of startup services.

ADJUSTING
Adjust initial temperature and humidity set points.
Set field-adjustable switches and circuit-breaker trip ranges as indicated.
Occupancy Adjustments: When requested from date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project for this purpose.

END OF SECTION 237433

DIVISION 26 – ELECTRICAL

SECTION 260500 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

The electrical work included in all other divisions is the responsibility of the contractor performing the division 26 work unless noted otherwise.

PROJECT OVERVIEW
Word of Electrical Section shall include but not limited to Phase 1 of project. Provide installation of related electrical work for construction and electrical equipment for servicing computer room. Provide by-pass switch, UPS and panel UP, including receptacles in Computer Room 3.

SCOPE
The work under this section includes basic electrical requirements, which are applicable to all Division 26 sections. This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS
Abbreviations of standards organizations referenced in this and other sections are as follows:

ANSI American National Standards Institute
ASTM American Society for Testing and Materials
EPA Environmental Protection Agency
ETL Electrical Testing Laboratories, Inc.
IEEE Institute of Electrical and Electronics Engineers
IES Illuminating Engineering Society
ISA Instrument Society of America
NBS National Bureau of Standards
NEC National Electric Code
NEMA National Electrical Manufacturers Association
NESC National Electrical Safety Code
NFPA National Fire Protection Association
UL Underwriters Laboratories Inc.

REGULATORY REQUIREMENTS
All work and materials are to conform in every detail to applicable rules and requirements of the Wisconsin State Electrical Code Volumes 1 and 2, the National Electrical Code (ANSI/NFPA 70), other applicable National Fire Protection Association

codes, the National Electrical Safety Code, and present manufacturing standards (including NEMA).

All Division 26 work shall be done under the direction of a currently certified State of Wisconsin Certified Master Electrician.

QUALITY ASSURANCE

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and the assigned space and for obtaining the performance from the system into which these items are placed.

Manufacturer references used herein are intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.

All materials, except medium voltage equipment and components, shall be listed by and shall bear the label of an approved electrical testing laboratory. If none of the approved electrical testing laboratories has published standards for a particular item, then other national independent testing standards, if available, applicable, and approved by WisDOT, shall apply and such items shall bear those labels. Where one of the approved electrical testing laboratories has an applicable system listing and label, the entire system, except for medium voltage equipment and components, shall be so labeled.

CONTINUITY OF EXISTING SERVICES AND SYSTEMS

No outages shall be permitted on existing systems except at the time and during the interval specified by the user agency and by the WisDOT Project Representative. The institution may require written approval. Any outage must be scheduled when the interruption causes the least interference with normal institutional schedules and business routines. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours.

This Contractor shall restore any circuit interrupted as a result of this work to proper operation as soon as possible. Note that institutional operations are on a seven-day week schedule.

PROTECTION OF FINISHED SURFACES

Furnish one can of touch-up paint for each different color factory finish furnished by the Contractor. Deliver touch-up paint with other "loose and detachable parts" as covered in the General Requirements.

APPROVED ELECTRICAL TESTING LABORATORIES

The following laboratories are approved for providing electrical product safety testing and listing services as required in these specifications:

Underwriters Laboratories Inc.
Electrical Testing Laboratories, Inc.

SLEEVES AND OPENINGS

SEALING AND FIRESTOPPING

Sealing and firestopping of sleeves/openings between conduits, cable trays, wireways, troughs, cablebus, busduct, etc. and the structural or partition opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and firestopping. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation.

STATE AND/OR USER AGENCY FURNISHED EQUIPMENT

WORK BY STATE AND/OR USER AGENCY

PCB equipment (other than light fixture ballasts) removal and disposal, if required, will be by the WisDOT under separate contract.

Electrical testing not described in these contract documents will be by the WisDOT under separate contract.

PROVISIONS FOR FUTURE WORK

INTENT

The Contractor shall furnish and install all the necessary materials, apparatus, and devices to complete the electrical equipment and systems installation herein specified, except such parts as are specifically exempted herein.

If an item is either called for in the specifications or shown on the plans, it shall be considered sufficient for the inclusion of said item in this contract. If a conflict exists within the Specifications or exists within the Drawings, the Contractor shall furnish the item, system, or workmanship, which is the highest quality, largest, or most closely fits the WisDOT's intent (as determined by the WisDOT Project Manager). Refer to the General Conditions of the Contract for further clarification.

It must be understood that the details and drawings are diagrammatic. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.

All sizes as given are minimum except as noted.

Materials and labor shall be new (unless noted or stated otherwise), first class, and workmanlike, and shall be subject at all times to the WisDOT's and/or A/E's inspections, tests and approval from the commencement until the acceptance of the completed work.

Whenever a particular manufacturer's product is named, it is intended to establish a level of quality and performance requirements unless more explicit restrictions are stated to apply.

OMISSIONS
No later than 10 days before bid opening, the Contractor shall call the attention of the WisDOT to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

SUBMITTALS
Submit for all equipment and systems as indicated in the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Failure to do this may result in the submittal(s) being returned to the Contractor for correction and resubmission. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.

On request from the WisDOT, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.

Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered equipment.

The submittals must be approved before fabrication is authorized.

Submit sufficient quantities of submittals to allow the following distribution:

Operating and Maintenance Manuals:	2 copies
User agency:	2 copies
A/E:	1 copy
WisDOT Field Office:	1 copy

PROJECT/SITE CONDITIONS
Install Work in locations shown on Drawings, unless prevented by Project conditions.

Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of WisDOT before proceeding.

Tools, materials and equipment shall be confined to areas designated by the WisDOT and user agency.

WORK SEQUENCE AND SCHEDULING
Install work in phases to accommodate user agency's occupancy requirements. During the construction period coordinate electrical schedule and operations with WisDOT's Construction Representatives.

WORK BY OTHER TRADES
Every attempt has been made to indicate in this trade's specifications and drawings all work required of this Contractor. However, there may be additional specific paragraphs in other trade specifications and addenda, and additional notes on drawings for other trades which pertain to this Trade's work, and thus those additional requirements are hereby made a part of these specifications and drawings.

Electrical details on drawings for equipment to be provided by others are based on preliminary design data only. This Contractor shall lay out the electrical work and shall be responsible for its correctness to match equipment actually provided by others.

OFFSITE STORAGE
If payment will be requested for approved offsite stored material, then the Contractor shall complete an "Off-site Storage Agreement" which is available from the WisDOT. Prior approval by WisDOT personnel for offsite storage will be needed. No material will be accepted for offsite storage unless submittals for the material have been approved.

REQUEST AND CERTIFICATE FOR PAYMENT
Within 10 days after Notice to Proceed, the successful bidder will submit to the WisDOT in a form prescribed below and by the Division 1 requirements, a cost breakdown of the proposed values for work performed which, if approved by the WisDOT, will become the basis for construction progress and monthly payments. The cost breakdown items shall reflect actual work progress stages as closely as feasible.

In addition, if payment will be requested for approved off-site stored material, then that material shall be listed as a line item and the Contractor shall complete an "Off-site Storage Agreement" which is available from the WisDOT.

SALVAGE MATERIALS
No materials removed from this project shall be reused except as specifically noted below. All materials removed shall become the property of and shall be disposed of by the Contractor.

CERTIFICATES AND INSPECTIONS
Obtain and pay for all required State installation inspections except those provided by the WisDOT in accordance to Wis. Adm. Code Section Comm. 61.30. Deliver originals of these certificates to the WisDOT's Project Representative.

This contractor is responsible for coordination of WisDOT electrical inspection. Inspection requirements will be issued at a pre-installation meeting, arranged by this contractor and the WisDOT Electrical Inspector (See Article 15 of the General Conditions).

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section 017823 Operation and Maintenance Data.

In addition to the general content specified under Section 017823 Operation and Maintenance Data, supply the following additional documentation:

1. Manufacturer’s wiring diagrams for electrically powered equipment.

RECORD DRAWINGS

The Contractor shall maintain at least one copy each of the specifications and drawings on the job site at all times.

The WisDOT will provide the Contractor with a suitable set of contract drawings on which daily records of changes and deviations from contract shall be recorded. Dimensions and elevations on the record drawings shall locate all buried or concealed piping, conduit, or similar items.

The daily record of changes shall be the responsibility of Contractor's field superintendent. No arbitrary mark-ups will be permitted.

At completion of the project, the Contractor shall submit the marked-up record drawings to the WisDOT prior to final payment.

PART 2 - PRODUCTS

ACCESS PANELS AND DOORS

Lay-in Ceilings:

Removable lay-in ceiling tiles in 2 x 2 foot or 2 x 4 foot configuration provided under other divisions are sufficient; no additional access provisions are required unless specifically indicated.

Concealed Spline Ceilings:

Removable sections of ceiling tile held in position with metal slats or tabs compatible with the ceiling system used will be provided under other divisions.

Metal Pan Ceilings:

Removable sections of ceiling tile held in position by pressure fit will be provided under other divisions.

Plaster Walls and Ceilings:

16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers and similar wet areas, concealed hinges, screwdriver operated cam latch for general application, key lock for use in public areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the equipment needing service; minimum size is 12" by 12".

IDENTIFICATION
See Electrical section 26 05 53 – Identification for Electrical Systems.

SEALING AND FIRESTOPPING
FIRE AND/OR SMOKE RATED PENETRATIONS:

Manufacturers:
3M, STI/SpecSeal, Tremco, Hilti or approved equal.

All firestopping systems shall be by the same manufacturer.

Submittals:
Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgment can be based upon.

Product:
Firestop systems shall be UL listed or tested by an independent testing laboratory approved by the Department of Commerce.

Use a product that has a rating not less than the rating of the wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.

Contractor shall use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

NON-RATED PENETRATIONS:
Conduit Penetrations Through Below Grade Walls:
In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated conduit and the cored opening or a water-stop type wall sleeve.

Conduit and Cable Tray Penetrations:
At conduit and cable tray penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between conduit and sleeve, or the core drilled opening.

PART 3 - EXECUTION

EXCAVATION AND BACKFILL

Perform all excavation and backfill work to accomplish indicated electrical systems installation in accordance to WisDOT standards. Blasting will not be allowed without written permission of the WisDOT.

CONCRETE WORK

The Division 3 Contractor will perform all cast-in-place concrete unless noted otherwise elsewhere. Provide all layout drawings, anchor bolts, metal shapes, and/or templates required to be cast into concrete or used to form concrete for the support of electrical equipment.

CUTTING AND PATCHING

Refer to Section 017329, Cutting and Patching.

BUILDING ACCESS

Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

EQUIPMENT ACCESS

Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors with the General Contractor, making sure that access is available for all equipment and specialties. Where access is required in plaster or drywall walls or ceilings, furnish the access doors to the General Contractor and reimburse the General Contractor for installation of those access doors.

COORDINATION

The Contractor shall cooperate with other trades and WisDOT's personnel in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical work to better fit the general installation, such work shall be done at no extra cost to the WisDOT, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

The Contractor shall verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to light fixtures, panelboards, devices, etc. and recessed or semi-recessed heating units installed in/on architectural surfaces.

Coordinate all work with other contractors prior to installation. Any installed work that is not coordinated and that interferes with other contractor's work shall be removed or relocated at the installing contractor's expense.

Cooperate with the testing consultant in ensuring specification Section 260504 compliance. Verify system completion to the testing consultant. Demonstrate the starting, interlocking and control features of each system so the testing contractor can perform its work.

SLEEVES

Pipe sleeves for conduits 6" in diameter and smaller, in new poured concrete construction, shall be schedule 40 steel pipe, plastic removable sleeve or sheet metal sleeve, all cast in place.

In wet area floor penetrations, top of sleeve to be 2 inches above the adjacent floor. In existing wet area floor penetrations, core drill sleeve openings large enough to insert schedule 40 sleeve and grout the area around the sleeve. If a pipe clamp resting on the sleeve supports the pipe penetrating the sleeve, weld a collar or struts to the sleeve that will transfer weight to the existing floor structure. Wet areas for this paragraph are rooms or spaces containing air handling unit coils, converters, pumps, chillers, boilers, and similar waterside equipment.

Pipe penetrations in existing concrete floors that are not in wet areas may omit the use of schedule 40 sleeve and use the core drilled opening as the sleeve.

SEALING AND FIRESTOPPING

Fire and/or Smoke Penetrations:

Install approved product in accordance to the manufacturer's instructions where a pipe (i.e. cable tray, bus, cable bus, conduit, wireway, trough, etc.) penetrates a fire rated surface.

Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support any substantial weight.

Non-Rated Surfaces:

When the opening is through a non-fire rated wall, floor, ceiling or roof the opening must be sealed using an approved type of material.

Install escutcheons or floor/ceiling plates where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces for this paragraph include only those rooms with finished ceilings and the penetration occurs below the ceiling.

In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the conduit and tighten in place, in accordance to the manufacturer's instructions. Install so that the bolts used to tighten the seal are accessible from the interior of the building or vault.

At interior partitions, conduit penetrations are required to be sealed for all clean rooms, laboratories, and most hospital spaces, computer rooms, dormitory rooms, tele/data/com rooms and similar spaces where the room pressure or odor transmission must be controlled. Apply sealant to both sides of the penetration in such a manner that the annular space between the conduit sleeve and the conduit is completely filled.

HOUSEKEEPING AND CLEAN UP

The Contractor shall clean up and remove from the premises, on a daily basis, all debris and rubbish resulting from its work and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

AGENCY TRAINING

All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 017900.

END OF SECTION 26 05 00

SECTION 260502 – ELECTRICAL DEMOLITION FOR REMODELING

PART 1 - GENERAL

SCOPE
The work under this section includes removal of lighting and devices as indicated on drawing and as necessary for installation of new work.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

PART 2 - PRODUCTS

MATERIALS AND EQUIPMENT
Materials and equipment for patching and extending work as specified in the individual Sections.

PART 3 - EXECUTION

EXAMINATION
Verify field measurements and circuiting arrangements as shown on Drawings.

Verify that abandoned wiring and equipment serve only abandoned facilities.

Demolition Drawings are based on casual field observation and/or existing record documents. Report discrepancies to the User Agency, Architect/Engineer and WisDOT Field Representative before disturbing existing installation.

Beginning of demolition means installer accepts existing conditions.

PREPARATION
Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

Coordinate utility service outages with the User Agency, WisDOT Field Representative, Architect, and Engineer. Also, if applicable, coordinate utility service outages with the local Utility Company.

Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations. In particular, all security and safety systems must be maintained in operation at all times as required by the User Agency. This includes security and safety lighting.

Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from the User Agency and WisDOT Field Representative

at least 48 hours before partially or completely disabling system. Minimize outage duration. If required, make temporary connections to maintain service in areas adjacent to work area.

Existing Fire Alarm System: Maintain existing system in service until new system is accepted. Disable system only to make switchovers and connections. Obtain permission from the User Agency, WisDOT Field Representative and local Authority Having Jurisdiction at least 48 hours before partially or completely disabling system. Minimize outage duration. If required, make temporary connections to maintain service in areas adjacent to work area.

Existing Communication/Data System: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Obtain permission from the User Agency, WisDOT Field Representative and local Telephone Utility. If required, make temporary connections to maintain service in areas adjacent to work area.

DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

Demolish and extend existing electrical work to meet all requirements of these specifications.

If certain raceways and boxes are abandoned but not scheduled for removal, those items must be shown on the "As Built Drawings".

Remove, relocate, and extend existing installations to accommodate new construction.

Remove abandoned wiring to source of supply.

Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets which are not removed.

Disconnect and remove abandoned panelboards and distribution equipment.

Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.

Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.

Repair adjacent construction and finishes damaged during demolition and extension work.

Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.

Extend existing installations using materials and methods compatible with existing electrical installations, or as specified. This includes the extension of the circuit from the last active device to the next device in the system to be activated.

LAMP AND PCB BALLAST HANDLING AND DISPOSAL
All lamps (fluorescent, incandescent, and HID) contain mercury and/or lead (in the base) as well as other heavy metals and compounds which are regulated by the EPA and DNR during the disposal process. As a result, regulations have been issued covering the handling and disposal of all lamps. Therefore, lamps which have been removed from service for disposal shall be handled as follows by the Contractor.

When making disposal arrangements with a licensed waste management company, the contractor shall notify them of the WisDOT project name and number, and the WisDOT project manager, for invoicing purposes. Invoicing from a licensed waste management company shall be sent to the WisDOT project manager for direct charge payment from that project (lamp and PCB ballast disposal costs to be paid by WisDOT).

The contractor shall coordinate the lamp and PCB ballast disposal with the WisDOT field representative.

CLEANING AND REPAIR
Clean and repair existing materials and equipment which remain or are to be reused.

Panelboards: Clean exposed surfaces and check tightness of electrical connections. Replace damaged circuit breakers and provide closure plates for vacant positions. Provide typed circuit directory showing revised circuiting arrangement.

Luminaires: Remove existing luminaires for cleaning. Use mild detergent to clean all exterior and interior surfaces; rinse with clean water and wipe dry. Replace lamps, ballasts (if required) and broken electrical parts.

INSTALLATION
Install relocated materials and equipment under the provisions of other sections.

END OF SECTION 260502

SECTION 260504 – CLEANING, INSPECTION, AND TESTING OF ELECTRICAL EQUIPMENT

PART 1 - GENERAL

SCOPE

The work under this section includes the required cleaning, repair, adjustment, calibration, maintenance and testing of electrical equipment, as specified herein. This applies only to new electrical and existing electrical equipment being furnished, modified, worked on or serviced by this contractor for this project.

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

GENERAL INSPECTION AND CLEANING OF ALL ELECTRICAL EQUIPMENT

Inspect for physical damage and abnormal mechanical and electrical conditions.

Any item found to be out of tolerance, or in any other way defective as a result of the required inspection or testing, shall be reported to the WisDOT. Procedure for repair and/or replacement will be outlined. After appropriate corrective action is completed the item shall be re-tested.

Compare equipment nameplate information with the latest single line diagram and report any discrepancies.

Verify proper auxiliary device operation and indicators.

Check tightness of accessible bolted electrical joints. Use torque wrench method.

Make a close examination of equipment and remove any shipping brackets, insulation, packing, etc. that may not have been removed during original installation.

Make a close examination of equipment and remove any dirt or other forms of debris that may have collected in existing equipment or in new equipment during installation.

Clean All Equipment:
Vacuum inside of panelboards, switchboards, switchgear, transformer core and coils, horizontal and vertical busducts, MCC's, fire alarm panels, comm/data, security panel, etc.
Loosen attached particles and vacuum them away.

Wipe all insulators with a clean, dry, lint free rag.
Clean insulator grooves.
Re-vacuum inside surfaces as directed by the WisDOT Construction Representative or Inspector

Inspect equipment anchorage.

Inspect equipment and bus alignment.

Check all heater elements for operation and control.

Lubricate nonelectrical equipment per manufacturer's recommendations.

Check fuse linkage and element for proper holder and current rating.

Check each fuse holder for adequate mechanical support of each fuse.

Verify interlocks and proper key distribution.

Verify proper phase barrier, materials and installation.

GROUNDING SYSTEMS
Inspect the ground system for adequate termination at all devices.

LIGHTNING ARRESTERS/SURGE SUPPRESSION
Inspect for physical damage such as chipped or fractured porcelain. Wipe clean.

Perform a ground continuity test to grounding system.

Verify the proper mounting and adequate clearance.

Verify the voltage of the units with system one line diagram. Report any discrepancies.

Verify the electronic surge protection device is connected properly and status lights are normal.

METERING AND INSTRUMENTATION
Examine all devices for broken parts, damage and wire connection tightness.

Meter selector switches shall be inspected for proper application and operation.

Verify the electronic meter is connected properly and displaying proper voltage and power quantities.

Inspect nameplate information for compatibility with one-line drawings.

Verify the instrument transformer connections with the system requirements.

Verify tightness of all bolted connections and assure adequate clearances exist from primary circuits to secondary circuit wiring and to grounds.

Verify that all required grounding and shorting connections exist and that those connections have good contact; i.e. sufficient surface area, good cleanliness, and proper pressure.

Verify proper primary and secondary fuses and required sizes.

BATTERY SYSTEMS
Inspect for physical damage and evidence of corrosion. Clean units.

Measure system charging voltage and each individual cell voltage.

Measure the electrolyte specific gravity and level.

Verify and compare measured values with manufacturer's specifications.

MECHANICAL AND ELECTRICAL INTERLOCK SYSTEM
Physically test each system to insure proper function, operation and sequencing.

Closure attempt shall be made on locked open devices.

Opening attempt shall be made on locked closed devices.

Key exchange shall be made with devices operated in off normal positions.

CABLES
600 Volt cable:
Visually inspect cables, lugs, connectors and all other components for physical damage and proper connections.
Check all cable connectors for tightness (with a torque wrench) and clearances. Torque test conductor terminations to manufacturer's recommendations.
Perform a 1000 vdc megger test on all secondary cables from the substation transformers to the secondary switchboards and on all switchboard feeders.

PANELBOARDS
Torque all the connections per the manufacturers spec. Verify phase wires, color coding, separate neutral and mechanical bonding. Verify circuit breaker operation. Verify the directory.

LIGHT FIXTURES
Check the bonding and proper lamping. Verify that recessed fixtures are installed with hold down clips. Confirm operation of the fixture with the proper switch or sensor.

OCCUPANCY SENSORS
Confirm operation of the sensor per the manufacturers spec.

BATTERY PACK EMERGENCY LIGHTING
Verify the operation per the manufacturers spec and run all of the diagnostic steps. Confirm proper grounding and location.

UPS SYSTEM
Operate and test the system per the manufacturers spec. Confirm the batteries and liquid level along with the transfer scheme.

AUTOMATIC TRANSFER SWITCHES
Coordinate with the future generator and the subsequent tests.

Check the automatic transfer switches and automatic start circuits for proper function.

MOTOR STARTERS AND MOTOR CONTROL CENTERS
Verify the control circuits. Confirm the fusing and the grounding of the control transformers. Torque all of the connections. Confirm the overload elements and the circuit breakers (fuse) for proper sizing. Verify all grounding. Operate and test each motor starter for proper operation.

END OF SECTION 260504

SECTION 260519 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE

PART 1 - GENERAL

SCOPE
THE WORK UNDER THIS SECTION INCLUDES FURNISHING AND INSTALLING REQUIRED WIRING AND CABLING SYSTEMS INCLUDING PULLING, TERMINATING AND SPLICING.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

Section 260533 – Raceway and Boxes for Electrical Systems.
Section 260553 – Identification for Electrical Systems.

REFERENCES
NFPA 70 National Electrical Code.

SUBMITTALS
Submit product data: Provide for each cable assembly type.

Submit factory test reports: Indicate procedures and values obtained.

Submit shop drawings for modular wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.

Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

PROJECT CONDITIONS
Verify that field measurements are as shown on Drawings.

Conductor sizes are based on copper.

Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet project conditions.

Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2 - PRODUCTS

GENERAL

All wire shall be new, delivered to the site in unbroken cartons and shall be less than one year old out of manufacturer's stock.

All conductors shall be copper.

Insulation shall have a 600 volt rating.

All conductors shall be stranded.

Stranded conductors may only be terminated with UL OR ETL Listed type terminations or methods: e.g. stranded conductors may not be wrapped around a terminal screw but must be terminated with a crimp type device or must be terminated in an approved back wired method.

BUILDING WIRE

Description: Single conductor insulated wire.

Insulation: Type THHN/THWN-2, XHHW-2 insulation for feeders and branch circuits with copper conductors.
Type THHN/THWN-2, XHHW-2 insulation for feeders with aluminum conductors.

VARIABLE FREQUENCY DRIVE (VFD) WIRE

All power wiring from the VFD output to the motor shall be type XHHW-2 insulation, single conductor wire.

UNDERGROUND WIRE FOR EXTERIOR WORK

Description: Stranded single or multiple conductor insulated wire.

Insulation: Type XHHW-2 or USE.

This wiring shall be used in all underground applications, except when run in a concrete-encased ductbank.

WIRING CONNECTORS

Split Bolt Connectors: Not acceptable.

Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment terminals. Not approved for splicing.

Twist Type Wire Connectors: Solderless twist type spring connector (wire-nut) with insulating cover for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller. The manufacturer’s wire fill capacity must be followed.

All wire connectors used in underground or exterior pull boxes shall be gel filled twist connectors or a connector designed for damp and wet locations. Gel filled twist type connectors can be used for copper conductor sizes 6 AWG and smaller for site lighting applications. The manufacturer's wire fill capacity must be followed.

Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; beveled cable entrances.

Compression (crimp) Connectors: Long barrel; seamless, tin-plated electrolytic copper tubing; internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps. Connector must be installed with a crimper tool listed for use with the manufacturer and type of compression connector.

Insulation Piercing Connectors: Molded insulated body, copper teeth, wrench tightened, UL 486B Listed. May be used only for connection of a tap conductor in run and tap type applications when main conductor is 8 AWG and larger.

PART 3 - EXECUTION

GENERAL WIRING METHODS

All wire and cable shall be installed in conduit.

Do not use wire smaller than 12 AWG for power and lighting circuits.

All conductors shall be sized to prevent excessive voltage drop at rated circuit ampacity. As a minimum use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 100 feet (30 m), and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet (61 m).

Make conductor lengths for parallel conductors equal.

Splice only in junction or outlet boxes.

No conductor less than 10 AWG shall be installed in exterior underground conduit.

Identify ALL low voltage, 600v and lower, wire per section 26 05 53.

Neatly train and lace wiring inside boxes, equipment, and panelboards.

WIRING INSTALLATION IN RACEWAYS

Pull all conductors into a raceway at the same time. Use Listed water or silicone based wire pulling lubricant for pulling 4 AWG and larger wires and for other conditions when necessary. Wax based lubricants are not allowed. Pulling lubricant is not required for low friction type products where the cable manufacturer recommends that cables be pulled without lube.

Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.

Completely and thoroughly swab raceway system before installing conductors.

Place all conductors of a given circuit (this includes phase wires, neutral (if any), and ground conductor) in the same raceway. If parallel phase and/or neutral wires are used, then place an equal number of phase and neutral conductors in same raceway or cable.

VFD Installations: Install VFD input wiring and output wiring in separate conduit systems. Do not mix VFD input power and output power, or control wiring in a common raceway.

WIRING CONNECTIONS AND TERMINATIONS
Splice only in accessible junction boxes.

Wire splices and taps shall be made firm, and adequate to carry the full current rating of the respective wire without soldering and without perceptible temperature rise.

All splices shall be so made that they have an electrical resistance not in excess of two feet (600 mm) of the conductor.

Use solderless twist type spring connectors (wire nuts) with insulating covers for wire splices and taps, 10 AWG and smaller.

Use mechanical or compression connectors for wire splices and taps, 8 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.

Thoroughly clean wires before installing lugs and connectors.

At all splices and terminations, leave tails long enough to cut splice out and completely re-splice.

FIELD QUALITY CONTROL
Field inspection and testing will be performed under provisions of Section 260504.

Additional testing as follows shall be performed if aluminum conductors are used:

Equipment terminated with aluminum conductors shall be tested with a thermal imager and recorded.

Conductors shall be closely checked for loose or poor connections, and for signs of overheating or corrosion.

Test procedures shall meet NETA guidelines.

Test results and report shall be provided to the engineer.

Contractor shall correct all deficiencies reported in the test report.

WIRE COLOR

General:

Solid colored insulation is required for all THHN/THWN-2 wire. For other wire types use colored wire or identify wire with colored tape at all terminals, splices and boxes. Wire shall be colored as indicated below.

In existing facilities, use existing color scheme.

In new facilities, use black and red for single phase circuits at 120/240 volts, use Phase A black, Phase B red and Phase C blue for circuits at 120/208 volts single or three phase, and use Phase A brown, Phase B orange and Phase C yellow for circuits at 277/480 volts single or three phase. Note: This includes fixture whips except for Listed whips mounted by the fixture manufacturer on the fixture and Listed as a System.

All switch legs shall be the same color as their associated circuit. Traveler conductors run between 3 and 4 way switches shall be colored pink or purple.

Neutral Conductors: White for 120/208V and 120/240V systems, Gray for 277/480V systems. Where there are two or more neutrals in one conduit, each shall be individually identified with a different stripe.

Branch Circuit Conductors: Three or four wire home runs shall have each phase uniquely color coded.

Feeder Circuit Conductors: Each phase shall be uniquely color coded.

Ground Conductors: Green colored insulation for THHN/THWN-2 wire. For other wire types use green colored wire or identify wire with green tape at both ends and at all access points, such as panelboards, motor starters, disconnects and junction boxes. When isolated grounds are required, contractor shall provide green with yellow tracer.

BRANCH CIRCUITS

The use of single-phase, multi-wire branch circuits with a common neutral is not permitted. All single-phase branch circuits shall be furnished and installed with an individual accompanying neutral, sized the same as the phase conductors.

EMERGENCY CIRCUITS

All emergency system wiring (level 1 and level 2) shall be installed in separate raceways after their associated transfer switches. The wiring shall be separate from each other and from all normal system wiring.

CONSTRUCTION VERIFICATION ITEMS
Contractor is responsible for construction verification of existing conditions.

END OF SECTION 260519

SECTION 260526 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

SCOPE
The work under this section includes grounding electrodes and conductors, equipment grounding conductors, and bonding.

All hardware, cables and related termination and support hardware shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in this and related sections.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

REFERENCES
NFPA 70 - National Electrical Code
ANSI/IEEE 142 (Latest edition) - Recommended Practice for Grounding of Industrial and Commercial Power Systems
UL 467 Electrical Grounding and Bonding Equipment
IEEE 837 - IEEE Standard for Qualifying Permanent Connections Used in Substation Grounding
ANSI J-STD-607-B – Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications
TIA/EIA-606-A - Administration Standard for Commercial Telecommunications Infrastructure

PERFORMANCE REQUIREMENTS
Grounding System Resistance:

- Equipment Rated 500 KVA and Less: 10 ohms maximum at building service entrance.
- Communications Busbars: 5 ohms maximum.

Testing of grounding system resistance is to be witnessed by the WisDOT electrical inspector or Field Representative. Provide test report of grounding system resistance in final O&M manuals.

Testing of grounding system resistance is to be witnessed by the WisDOT electrical inspector or Field Representative. Provide test report of grounding system resistance in final O&M manuals.

SUBMITTALS
Product Data: Provide data for grounding electrodes and connections.

Test Reports: Indicate overall resistance to ground [and resistance of each electrode].

Manufacturer's Instructions: Include instructions for preparation, installation and examination oexothermic connectors.

PROJECT RECORD DOCUMENTS
Accurately record locations of all ground rods and other grounding electrodes.

REGULATORY REQUIREMENTS
Conform to requirements of NFPA 70.

Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 - PRODUCTS

ROD ELECTRODE
Material: Copper-clad steel.

Diameter: 3/4 inch (19 mm) minimum.

Length: 10 feet (3.5 m) minimum. Rod shall be driven at least 9' 6" deep.

MECHANICAL CONNECTORS
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 and shall be of the two bolt type.

Split bolt connector types are NOT allowed. Exception: the use of split bolts is acceptable for grounding of wire- basket type cable tray, and for cable shields/straps of medium voltage cable.

The connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size and manufacturer.

COMPRESSION CONNECTORS
The compression connectors shall be manufactured from pure wrought copper. The conductivity of this material shall be no less than 99% by IACS standards.

Each connector shall be factory filled with an oxide-inhibiting compound.

The connectors shall meet or exceed the performance requirements of IEEE 837, latest revision.

The connectors shall be clearly marked with the manufacturer, catalog number, conductor size and the required compression tool settings.

The installation of the connectors shall be made with a compression tool and die system, as recommended by the manufacturer of the connectors, and shall be irreversible.

Pre-crimping of the ground rod is required for all irreversible compression connections to a ground rod.

Terminal lug for communication system grounding shall be compression type and conform to the following:

Material:	Tin Plated Copper (aluminum not permitted).
Wire Size:	To match conductor
Number of Stud Holes:	2
Stud Hole Size:	3/8”
Bolt Hole Spacing:	per ANSI Joint Standard J-STD-607-A Tongue Angle: Straight

EXOTHERMIC CONNECTIONS
As manufactured by Cadweld or similar.

CONDUCTORS
Material: Stranded copper (aluminum not permitted).

Grounding Electrode Conductor: Size as shown on drawings, specifications or as required by NFPA 70, whichever is larger.

Feeder and Branch Circuit Equipment Ground: Size as shown on drawings, specifications or as required by NFPA 70, whichever is larger. Differentiate between the normal ground and the isolated ground when both are used at the same facility.

Conductors for Telecommunications shall be as follows:
Telecommunications Bonding Conductor (TMGB to Service Ground): No. 3/0 minimum or as shown on drawings.
Telecommunications Bonding Backbone (TBB; TMGB to TGB): No. 3/0 minimum or as shown on drawings.
Telecommunications Grounding Equalizer (GE): No. 3/0 minimum or as shown on drawings.
Bonding Conductors shall be insulated with a Green Jacket or jacket marked with Green Tape or labeled per NEC Guidelines

BUS/BUSBAR
Material: Copper (aluminum not permitted).

Size: All Power systems: 1/4" X 2", length as needed.
Telecommunications Main Ground Busbar (TMGB): 1/4" x 4" x 20" long (minimum).
Telecommunications Grounding Busbar (TGB): 1/4" x 2" x 12" long (minimum).
Busbars for Telecommunications shall:

Be pre-drilled to accommodate two-hole lugs.
3/8" stud hole size; hole spacing per ANSI J-STD-607-A.
Incorporate insulators and stand-off brackets that electrically isolate busbar from mounting surface.

PART 3 - EXECUTION

EXAMINATION
Verify that final backfill and compaction has been completed before driving rod electrodes.

GENERAL
Install Products in accordance to manufacturer's instructions.

Mechanical connections shall be accessible for inspection and checking. No insulation shall be installed over mechanical ground connections.

Ground connection surfaces shall be cleaned and all connections shall be made so that it is impossible to move them.

Attach grounds permanently before permanent building service is energized.

Terminate each grounding conductor on its own terminal lug. Sharing a single lug by multiple conductors is not allowed.

All grounding electrode conductors and individual grounding conductors shall be installed in PVC conduit, in exposed locations.

LESS THAN 600 VOLT ELECTRICAL SYSTEM GROUNDING
Supplementary Grounding Electrode: Use effectively grounded metal frame of the building.

Provide code sized copper grounding electrode conductor from secondary switchboard ground bus, each separately derived system neutral, secondary service system neutral to street side of water meter, building steel, ground rod, and any concrete encased electrodes. Provide bonding jumper around water meter.

Equipment Grounding Conductor: Provide separate, insulated equipment grounding conductor within each raceway. Terminate each end on suitable lug, bus, enclosure or bushing. Provide a ground wire from each device to the respective enclosure.

Bond together system neutrals, service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors, and plumbing systems.

Install ground grid under access floors where indicated. Construct grid of #4 AWG bare copper wire installed on 72 inch centers both ways. Bond each access floor support pedestal to grid.

Bond together each metallic raceway, pipe, duct and other metal object entering space under access floors. Bond to under floor ground grid. Use #4 AWG bare copper conductor.

COMMUNICATION SYSTEM GROUNDING

Grounding and Bonding System for Communications shall be an isolated grounding system with a single ground point. That ground point is to be the common grounding electrode system at the building electrical service entrance.

The system shall be compliant with ANSI J-STD-607-B with the exception that the ground cable shall not be bonded to building steel except at the electrical service entrance.

Provide Grounding Busbar for Telecommunications at each Telecommunications Room, the Main Equipment Room and at the electrical service entrance per project drawings. Coordinate Busbar location(s) and conductor routing per drawings with Division 27 contractor.

Provide Telecommunications Bonding Conductor from Telecommunications Main Grounding Busbar (TMGB) at the Communications Entrance Facility to building common grounding electrode system. Attach grounding conductor to building steel as allowed only at the main electrical service entrance.

Provide Telecommunications Bonding Backbone (TBB) conductor from the TMGB to Telecommunications Grounding Busbar (TGB) at each Telecommunication Room, Telecommunications Equipment Room and Telecommunications Enclosure.
TBB shall be continuous and not connected through Telecommunications Grounding Busbars (TGBs).
Bond TGBs to TBB via tap off of TBB. Gauge of conductor to be same at TBB.
Leave 10 feet slack in conductor from TBB to TGB at TGB location(s).
Do not bond TBB or TGB to building steel at TGB location(s).

Provide Grounding Equalizer(s) (GE) per project drawings. Connect GE conductor directly to TGBs being interconnected.

FIELD QUALITY CONTROL

Inspect grounding and bonding system conductors and connections for tightness and proper installation.

IDENTIFICATION AND LABELING
Label Grounds at point of termination.

Label the connections from the Telecommunications Bonding Backbone (TBB) conductor to the Telecommunications Main Grounding Busbar (TMGB) and the Telecommunications Grounding Busbar TGB(s). The label shall be plastic and include the following:

CONSTRUCTION VERIFICATION
Contractor is responsible for construction verification of existing conditions.

END OF SECTION 260526

SECTION 260529 – HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

SCOPE
The work under this sections includes conduit and equipment supports, straps, clamps, steel channel, etc, and fastening hardware for supporting electrical work.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

SUBMITTALS
Product Data: Provide data for support channel.

QUALITY ASSURANCE
Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

MATERIAL
Support Channel: Steel, Galvanized, Enameled or other corrosion resistant.

Hardware: Corrosion resistant.

Minimum sized threaded rod for supports shall be 3/8" for trapezes and single conduits 1-1/4" and larger, and ¼" for single conduits 1" and smaller.

Conduit clamps, straps, supports, etc., shall be steel or malleable iron. One-hole straps shall be heavy duty type. All straps shall have steel or malleable backing plates when rigid steel conduit is installed on the interior or exterior surface of any exterior building wall.

PART 3 - EXECUTION

INSTALLATION
Fasten hanger rods, conduit clamps, outlet, junction and pull boxes to building structure using pre-cast insert system, preset inserts, beam clamps, expansion anchors, or spring steel clips (interior metal stud walls only).

Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchors on concrete surfaces; sheet metal screws in sheet metal studs and wood screws in wood construction. If nail-in anchors are used, they must be removable type anchors.

Power-actuated fasteners and plastic wall anchors are not permitted.

File and de-bur cut ends of support channel and spray paint with cold galvanized paint to prevent rusting.

Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit. Do not fasten to suspended ceiling grid system.

Do not drill structural steel members unless approved by WisDOT.

Fabricate supports from galvanized structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.

In wet locations, mechanical rooms and electrical rooms install free-standing electrical equipment on 3.5 inch (89 mm) concrete pads.

Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch (25 mm) off wall (7/8" Uni-strut or 3/4" painted, fire-retardant plywood is acceptable).

Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.

Furnish and install all supports as required to fasten all electrical components required for the project, including free standing supports required for those items remotely mounted from the building structure, catwalks, walkways etc.

END OF SECTION 260529

SECTION 260533 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

SCOPE

The work under this section includes conduits, surface raceways, multi-outlet assemblies, auxiliary gutters, wall duct, and boxes for electrical systems including wall and ceiling outlet boxes, floor boxes, and junction boxes.

The work under this section includes raceway and boxes system for installation of Fire Alarm System cabling installed under Section 280528.33.

The work under this section includes empty raceway and boxes system for installation of voice and data systems furnished by Owner.

The work under this section includes empty raceway and boxes system for installation of card reader, access control systems.

RELATED WORK

Applicable provisions of Division 1 govern work under this section.

Section 260529 – Hangers and Supports for Electrical Systems.
Section 262726 – Wiring Devices.
Section 262702 – Equipment Wiring Systems.
Section 283100 – Fire Detection and Alarm.

SUBMITTALS

Surface Raceway System - submit product data and catalog sheets for all components.

Boxes - provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2 - PRODUCTS

RIGID METAL CONDUIT AND FITTINGS

Conduit: Heavy wall, galvanized steel, schedule 40, threaded.

Fittings and Conduit Bodies: Use all steel threaded fittings and conduit bodies.

INTERMEDIATE METAL CONDUIT (IMC) AND FITTINGS

Conduit: Galvanized steel, threaded.

Fittings and Conduit Bodies: Use all steel threaded fittings and conduit bodies.

ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS
Conduit: Steel, galvanized tubing.

Fittings: All steel, set screw, concrete tight. No push-on or indenter types permitted.
Conduit Bodies: All steel threaded conduit bodies.

FLEXIBLE METAL CONDUIT AND FITTINGS
Conduit: steel, galvanized, spiral strip.

Fittings and Conduit Bodies: All steel, galvanized, or malleable iron (except as allowed in specification 26 51 13).

LIQUIDTIGHT FLEXIBLE METAL CONDUIT AND FITTINGS
Conduit: flexible, steel, galvanized, spiral strip with an outer Liquidtight, nonmetallic, sunlight-resistant jacket.

Fittings and Conduit Bodies: ANSI/NEMA FB 1, compression type. There shall be a metallic cover/insert on the end of the conduit inside the connector housing to seal the cut conduit end.

ELECTRICAL NONMETALLIC TUBING (ENT) AND FITTINGS
Conduit: ENT (smurf tube), UL listed and NEC recognized.

Fittings: One piece quick connect fittings for 1/2 inch to 1 inch size and schedule 40 cemented fittings for larger size. When installed in concrete, fittings shall be suitable for damp locations and shall be concrete–tight, stub-ups and stub-downs kits shall meet manufacturer's recommendations.

RIGID NONMETALLIC CONDUIT AND FITTINGS
Conduit: Schedule 40 PVC minimum, Listed, sunlight resistant, rated for 900 C conductors.

Fittings and Conduit Bodies: NEMA TC 2, Listed.

CONDUIT SUPPORTS
See section 260529.

OUTLET BOXES
Sheet Metal Outlet Boxes: galvanized steel, with stamped knockouts.

Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 3/8 inch male fixture studs where required.

Concrete Ceiling Boxes: Concrete type.

Cast Boxes: Cast ferroalloy, or aluminum type deep type, gasketed cover, threaded hubs.

PULL AND JUNCTION BOXES
Pull boxes and junction boxes shall be minimum 4 inch square (100 mm) by 2 1/8th inches (54 mm) deep for use with 1 inch (25 mm) conduit and smaller. On conduit systems using 1 1/4 inch (31.75 mm) conduit or larger, pull and junction boxes shall be sized per NEC but not less than 4 11/16 inch square (117 mm).

For telecommunication, fiber optic, security, and other low voltage cable installations the NEC box size requirements shall apply. All boxes, used on telecommunication, security, other low voltage and fiber optic systems with conduits of 1 1/4" and larger, shall be sized per the NEC conduit requirements. For determining box size, the conduit is the determining factor not the wire size.

Sheet Metal Boxes: code gauge galvanized steel, screw covers, flanged and spot welded joints and corners.

Sheet Metal Boxes Larger than 12 Inches (300 mm) in any dimension shall have a hinged cover or a chain installed between box and cover.

Cast Metal Boxes for Outdoor and Wet Location Installations: Type 4 and Type 6, flat flanged, surface mounted junction box, UL listed as raintight. Galvanized cast iron or aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

Fiberglass or Concrete Handholes with weatherproof cover of non-skid finish shall be used for underground installations.

Box extensions and adjacent boxes within 48" of each other are not allowed for the purpose of creating more wire capacity.

Junction boxes 6" x 6" or larger size shall be without stamped knock-outs.

Wireways shall not be used in lieu of junction boxes.

GENERAL
All steel fittings and conduit bodies shall be galvanized.

No cast metal, or split-gland type fittings permitted.

Mogul-type condulets larger than 2 inch (50 mm) not permitted except as approved or detailed.

All condulet covers must be fastened to the condulet body with screws and be of the same manufacture.

Wireways, gutters and c-condulets shall not be used in lieu of pull boxes and condulets.

All boxes shall be of sufficient size to provide free space for all conductors enclosed in the box and shall comply with NEC requirements.

PART 3 - EXECUTION

CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

EMT is permitted to be used in sizes 4" (50 mm) and smaller for power and telecommunication systems. See CONDUIT INSTALLATION SCHEDULE below for other limitations for EMT and other types of conduit.

Size power conductor raceways for conductor type installed. Conduit size shall be 1/2 inch (13 mm) minimum except all homerun conduits shall be ¾", or as specified elsewhere. Caution: Per the NEC, the allowable conductor ampacity is reduced when more than three current-carrying conductors are installed in a raceway. Contractor must take the NEC ampacity adjustment factors into account when sizing the raceway and wiring system.

Size conduit for all other wiring, including but not limited to data, control, security, fire alarm, telecommunications, signal, video, etc. shall be sized per number of conductors pulled and their cross-section. 40% fill shall be maximum for all new conduit fills.

Arrange conduit to maintain headroom and present a neat appearance.

Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

Maintain minimum 6 inch (150 mm) clearance between conduit and piping. Maintain 12 inch (300 mm) clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized pipe straps, conduit racks (lay in adjustable hangers), clevis hangers, or bolted split stamped galvanized hangers.

Group conduit in parallel runs where practical and use conduit rack (lay in adjustable hangers) constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

Do not fasten conduit with wire or perforated pipe straps. Before conductors are pulled, remove all wire used for temporary conduit support during construction.

Support and fasten metal conduit at a maximum of 8 feet (2.4 m) on center.

Supports shall be independent of the installations of other trades, e.g. ceiling support wires, HVAC pipes, other conduits, etc., unless so approved or detailed.

In general, all conduit shall be concealed except where noted on the drawings or approved by the Architect/Engineer. Contractor shall verify with Architect/Engineer all surface conduit installations except in mechanical rooms.

Changes in direction shall be made with symmetrical bends, cast steel boxes, stamped metal boxes or cast steel conduit bodies.

For indoor conduits, no continuous conduit run shall exceed 100 feet (30 meters) without a junction box.

All conduits installed in exposed areas shall be installed with a box offset before entering box.

CONDUIT INSTALLATION
Cut conduit square; de-burr cut ends.

Conduit shall not be fastened to the corrugated metal roof deck.

Bring conduit to the shoulder of fittings and couplings and fasten securely.

Use conduit hubs for fastening conduit to cast boxes. Use sealing locknuts or conduit hubs for fastening conduit to sheet metal boxes in damp or wet locations.

All conduit terminations (except for terminations into conduit bodies) shall use conduit hubs, or connectors with one locknut, or shall use double locknuts (one each side of box wall) and insulated bushing. Provide bushings for the ends of all conduit not terminated in box walls. Refer to Section 260526 – Grounding and Bonding for Electrical Systems for grounding bushing requirements.

Install no more than the equivalent of three 90 degree bends between boxes.

Use hydraulic one shot conduit bender or factory elbows for bends in conduit larger than 2 inch (50 mm) size unless sweep elbows are required.

Conduit shall be bent according to manufacturers recommendations. Torches or open flame shall not be used to aid in bend of PVC conduit.

Use suitable conduit caps or other approved seals to protect installed conduit against entrance of dirt and moisture.

Provide 1/8 inch (3 mm) nylon pull string in empty conduit, except sleeves and nipples.

Install expansion deflection joints where conduit crosses building expansion joints. Note: expansion-deflection joints are not required where conduit crosses building control joints

if the control joint does not act as an expansion joint. Install expansion fitting in PVC conduit runs as recommended by the manufacturer.

Avoid moisture traps where possible. Where moisture traps are unavoidable, provide junction boxes with drain fittings at conduit low points.

Where conduit passes between areas of differing temperatures such as into or out of cool rooms, freezers, unheated and heated spaces, buildings, etc., provide Listed conduit seals to prevent the passage of moisture and water vapor through the conduit.

Route conduit through roof openings for piping and ductwork where possible.

Conduit is not permitted in any slab topping of two inches (50 mm) or less.

Ground and bond conduit under provisions of Section 260526.

Maximum Size Conduit in Slabs Above Grade: 3/4 inch (19 mm). Do not route conduits to cross each other in slabs above grade.

PVC conduit shall transition to galvanized rigid metal conduit before it enters a concrete pole base, foundation, wall (where exposed) or up through a concrete floor.

Identify conduit under provisions of Section 260553.

All conduit installed underground (exterior to building) shall be buried a minimum of 24" below finished grade, whether or not the conduit is concrete encased.

PVC conduit shall be cleaned with solvent, and dried before application of glue. The temperature rating of glue/cement shall match weather condition. Apply full even coat of cement/glue to entire area that will be inserted into fitting. The entire installation shall meet manufacturer's recommendations.

CONDUIT INSTALLATION SCHEDULE
Conduit other than that specified below for specific applications shall not be used.

Underground Installations Within Five Feet (1.5 m) of Foundation Wall: Rigid steel conduit.

Underground Installations More than Five Feet (1.5 m) From Foundation Wall: Rigid steel conduit. Plastic-coated rigid steel conduit. Schedule 40 PVC conduit.

Under Slab on Grade Installations: Schedule 40 PVC conduit.

Exposed Outdoor Locations: Rigid steel conduit.

Concealed in Concrete and Block Walls: Rigid steel conduit. Electrical metallic tubing. Schedule 40 PVC conduit. Electrical Nonmetallic Tubing (ENT).

Within Concrete Slab: Rigid steel conduit. Schedule 40 PVC conduit. Electrical Nonmetallic Tubing (ENT).

Wet Interior Locations: Rigid steel conduit.

Concealed Dry Interior Locations: Rigid steel conduit. Intermediate metal conduit. Electrical metallic tubing.

Exposed Dry Interior Locations: Rigid steel conduit. Intermediate metal conduit. Electrical metallic tubing.

Motor and equipment connections: Flexible PVC coated metal conduit (all locations). Minimum length shall be one foot (300 mm), maximum length shall be three feet (900 mm). Conduit must be installed perpendicular to direction of equipment vibration to allow conduit to freely flex.

Light fixtures: Direct box or conduit connection for surface mounted and recessed fixtures. Flexible metal conduit from a J-box for recessed lay-in light fixtures. Conduit size shall be 3/8" (10 mm) minimum diameter and six foot (1.8 M) maximum length. Conduit length shall allow movement of fixture for maintenance purposes.

Medium Voltage Applications (Interior Locations): Rigid steel conduit.

SURFACE METAL RACEWAY AND MULTI OUTLET ASSEMBLY INSTALLATION

Use flat head screws to fasten channel to surfaces every 24 inches. Mount plumb and level.

Use suitable insulating bushings and inserts at connections to outlets and corner fittings.

Maintain grounding continuity between raceway components to provide a continuous grounding path under provisions of Section 260526.

Fastener Option: Use clips and straps suitable for the purpose.

NONMETALLIC SURFACE RACEWAY INSTALLATION

Use flat headed screws with appropriate anchors to fasten channel to surfaces secured every 24 inches. Mount plumb and level. All surface mounted devices shall be fastened to the wall utilizing flat head screws along with appropriate anchors. No device shall be adhered to the wall surface using two-faced tape or any means other than as described above.

Use suitable insulating bushings and inserts at connections to outlets and corner fittings.

In areas where the walls cannot be fished, the station cable serving these outlets shall be covered with raceways. No exposed wire shall be permitted within offices, laboratories, and conference rooms or like facilities.

The non-metallic raceway shall have a screw applied base. Both the base and cover shall be manufactured of rigid PVC materials.

The raceway shall originate from a surface mounted box mounted adjacent to and at the same height as existing electrical boxes in the room, be attached to the wall and terminate above the ceiling.

All fittings including, but not limited to, extension boxes, elbows, tees, fixture bodies shall match the color of the raceway.

The raceway and all systems devices shall be UL listed and exhibit nonflammable self extinguishing characteristics, tested to specifications of UL94V-0.

The raceway and all systems devices shall adhere to the EIA/TIA Category 5e bend radius standard.

AUXILIARY GUTTERS (WIREWAYS) INSTALLATION

Bolt auxiliary gutter to wall using two piece hangers or steel channels fastened to the wall or in self supporting structure.

Gasket each joint in oil tight gutter.

Mount rain-tight gutter in horizontal position only.

Maintain grounding continuity between raceway components to provide a continuous grounding path under provisions of Section 260526.

COORDINATION OF BOX LOCATIONS

Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

Electrical box locations shown on Contract Drawings are approximate unless dimensioned. Verify location of floor boxes and outlets in offices and work areas prior to rough in.

No outlet, junction, or pull boxes shall be located where it will be obstructed by other equipment, piping, lockers, benches, counters, etc.

Boxes shall not be fastened to the metal roof deck.

It shall be the Contractor's responsibility to study drawings pertaining to other trades, to discuss location of outlets with workmen installing other piping and equipment and to fit all electrical outlets to job conditions.

In case of any question or argument over the location of an outlet, the Contractor shall refer the matter to the Architect/Engineer and install outlet as instructed by the Architect/Engineer.

The proper location of each outlet is considered a part of this contract and no additional compensation will be paid to the Contractor for moving outlets which were improperly located.

Locate and install boxes to allow access to them. Where installation is inaccessible, coordinate locations and provide 18 inch (450 mm) by 24 inch (600 mm) access doors.

Locate and install to maintain headroom and to present a neat appearance.

Install boxes to preserve fire resistance rating of partitions and other elements, using approved materials and methods.

OUTLET BOX INSTALLATION

Do not install boxes back to back in walls. Provide minimum 6 inch (150 mm) separation, except provide minimum 24 inch (600 mm) separation in acoustic rated walls.

Power:

Recessed (1/4” maximum) outlet boxes in masonry, concrete or tile construction shall be minimum 4 inch square, with device rings. Device covers shall be square-cut except rounded corner plaster rings are allowed in drywall applications. Angle cut plaster rings are not permitted. Coordinate masonry cutting to achieve neat openings for boxes.

Low Voltage:

Recessed (1/4” maximum) outlet boxes in masonry, concrete or tile construction shall be minimum 4 11/16 inch square, 2-1/8” deep. Device covers shall be square-cut except rounded corner plaster rings are allowed in drywall applications. Angle cut plaster rings are not permitted. Coordinate masonry cutting to achieve neat openings for boxes.

Provide knockout closures for unused openings.

Support boxes independently of conduit except for cast boxes that are connected to two rigid metal conduits, both supported within 12 inches (300 mm) of box.

Use multiple gang boxes where more than one device are mounted together; do not use sectional boxes. Provide non-metallic barriers to separate wiring of different voltage systems.

Install boxes in walls without damaging wall insulation.

Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.

Ceiling outlets shall be 4 inch square, minimum 2-1/8 inch (54 mm) deep except that concrete boxes and plates will be approved where applicable. Position outlets to locate luminaires as shown on reflected ceiling plans.

In inaccessible ceiling areas, position outlets and junction boxes within 6 inches (150 mm) of recessed luminaire, to be accessible through luminaire ceiling opening.

Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

Align wall mounted outlet boxes for switches, thermostats, and similar devices.

Provide cast ferroalloy or aluminum outlet boxes in exterior and wet locations.

Surface wall outlets shall be 4 inch (100 mm) square with raised covers for one and two gang requirements. For three gang or larger requirements, use gang boxes with non-overlapping covers.

FLOOR BOX INSTALLATION
Set boxes level and flush with finish flooring material.

PULL AND JUNCTION BOX INSTALLATION
Locate pull boxes and junction boxes above accessible ceilings, in unfinished areas or furnish and install WisDOT approved access panels in non-accessible ceilings where boxes are installed. All boxes are to be readily accessible.

Support pull and junction boxes independent of conduit.

CONSTRUCTION VERIFICATION ITEMS
Contractor is responsible for construction verification of existing conditions.

END OF SECTION 260533

SECTION 260553 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

SCOPE
The work under this section includes the products and execution requirements relating to labeling of power, lighting, general wiring, signal, fire alarm, and telecommunications wire and cabling. Further, this section includes labeling of all terminations and related sub-systems, including but not limited to nameplates, stenciling, wire and cable marker labeling of all backbone fiber optic (inter-building, tie & riser) cables, terminating equipment and labeling of inner duct (fiber optic).

RELATED WORK
Applicable provisions of Division 1 shall govern work under this section.

Section 260519 – Low-Voltage Electrical Power Conductors and Cables
Section 271000 – Communications Cable and Equipment

SUBMITTALS
Include schedule for nameplates and stenciling.

Prior to installation, the Contractor shall provide samples of all label types planned for the project. These samples shall include examples of the lettering to be used. Samples shall be mounted on 8 1/2" x 11" sheets annotated, explaining their purposed use.

PART 2 - PRODUCTS

MATERIALS
Labels: All labels shall be permanent, and machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS ARE ALLOWED. Exception: back side of device plates and junction boxes may use handwritten, legible labeling on box covers, unless specifically prohibited by other specification sections.

Cable label size shall be appropriate for the conductor or cable size(s), outlet faceplate layout and patch panel design. All labels shall be self-laminating, white/transparent vinyl and be wrapped around the cable or sheath. Labels for power conductors (600V and lower) shall be cloth-type. Flag type labels are not allowed. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminate over the full extent of the printed area of the label.

Nameplates: Engraved three layer laminated plastic, black letters on a white background. Emergency system (level 1 and level 2) shall use white letters on red background.

Tape (phase identification only): Scotch #35 tape in appropriate colors for system voltage and phase.

Adhesive type labels not permitted except for phase and wire identification. Machine generated adhesive labels shall be permitted for device plates, 4-11/16" and smaller junction boxes, Fire alarm and control devices.

PART 3 - EXECUTION

GENERAL

Where mixed voltages are used in one building (e.g. 4160 volt, 480 volt, 208 volt) each switch, switchboard, junction box, equipment, etc., on each system must be labeled for voltage in addition to other requirements listed herein.

All branch circuit and power panels must be identified with the same symbol used in circuit directory in main distribution center.

Clean all surfaces before attaching labels with the label manufacturer's recommended cleaning agent.

Install all labels firmly as recommended by the label manufacturer.

Labels shall be installed plumb and neatly on all equipment.

Install nameplates parallel to equipment lines.

Secure nameplates to equipment fronts using screws, rivets or manufacturer approved adhesive or cement.

Embossed tape will not be permitted for any application.

JUNCTION AND PULLBOX IDENTIFICATION

The following junction and pullboxes shall be identified utilizing spray painted covers:

System	Color(s)
Secondary Power – 208Y/120V, 240/120V	White
Emergency Power – 208Y/120V	White/Red
Fire Alarm	Red
Temperature Control	Green
Door Control and Door Monitoring System	Orange
Sound and Intercom Systems	Blue
Video Surveillance System/MATV	Yellow

Provide circuit numbers, and source panel designations for power wiring. Other system shall be identified as shown on details or approved shop drawings. Temperature control shall identify the source.

COMMUNICATIONS SYSTEM IDENTIFICATION AND LABELING

Backboard and Equipment Racks:

Backboards and equipment racks shall be labeled by the Contractor identifying the room number. Additionally, equipment racks shall have an alpha character after the room number unique to that particular communications room. For example, Rack 205A would be the first rack in room 205. Character height shall be 1-inch (minimum).

Station Cable and Termination Components:

Individual labels shall be placed on all Telecommunications Outlets, Data Patch Panels, Voice Termination Blocks, and cables. This is inclusive of each voice, data, video, or fiber optic outlet, or any configuration thereof, as identified on the drawings.

Each component shall be clearly labeled using a code identifying each information outlet location throughout the facility. The project documents identify the numbering at each outlet location. Each media type shall be numbered separately. The format of the identifier shall be as follows:

TR-####X
Where: TR = Telecommunication Room identifier serving that location
= a sequential number assigned to that port starting at 001
X = an alpha character identifying cable type. V=Voice, D=Data

For example: "1A-001D" represents the first data jack served from the Telecommunications Room on the first floor identified as room 1A for that building. A voice outlet at the same location would be labeled as "1A-001V".

Telecommunication Rooms identifiers shall be unique in each building.

Telecommunications Outlets are to be labeled 1) on the cover of the assembly and 2) on each cable terminated at that location.

All new outlet faceplates shall incorporate recessed label holders and shall be fitted with clear plastic covers. Where no such label holders are present on existing to remain outlets, the faceplate labels shall be protected with a clear over-laminate.

Labels shall be [White] background with [Black] lettering. Lettering size shall be as large as practicable (up to 16-point) to fit properly on the outlet label. No lettering shall be smaller than 12-point.

Copper Data and Fiber Optic Patch Panels shall be labeled identifying Outlet ID. Modular Jacks and/or Fiber Couplers shall be positioned in sequence of Outlet ID. Fiber Panels shall also be labeled with the fiber number. Fibers shall be sequenced in order per the manufacturer's color code.

Each Station Cable shall be labeled within 4-inches of the cable end at the Data Patch Panel, 110 blocks, and Information Outlet.

COMMUNICATION BACKBONE, RISER AND TIE CABLE LABELING
All fiber optic backbone and copper (inter-building, riser and tie) cables shall be identified AT BOTH ENDS with a designation that identifies where the opposite end of the same cable terminates (e.g. Equipment Room or Telecommunications Closet I.D.). In addition, labeling of all fiber optic cables shall include the number of fibers in the cable.

Each fiber optic termination panel shall be clearly labeled indicating the destination of the cable(s) and the fiber number of each fiber position. The cable identifiers are to be secured to (1) the side and (2) the front cover of the panel enclosure.

INNERDUCT LABELING
All innerduct containing fiber optic cable installed under this project shall be labeled where exposed. This includes areas where the innerduct is (1) installed alone in risers, tunnels or trays, (2) where they transit manholes and/or pull boxes and (3) in equipment rooms.

The innerduct shall be labeled with a durable Yellow Polyethylene tag which reads "CAUTION FIBER OPTIC CABLE" and includes blank spaces for adding fiber count and destination information. The destination of the cable(s) contained in the innerduct and the fiber count shall be marked on the tag. Hand lettering is acceptable on this tag, using an indelible type ink.

The tag shall be secured to the innerduct(s) using self-locking ties.

Innerduct shall be labeled on each floor in a riser installation, in each manhole and/or handhole or at 25 foot intervals in a tunnel or tray installation.

COMMUNICATION CONDUIT LABELING
All conduits installed between Telecommunication Rooms shall be clearly labeled in accordance to ANSI/TIA/EIA-606. Both ends of the conduits shall be labeled. All labels shall be mechanical, no hand written labels. The label shall indicate the location of the far end of the conduit run and a unique conduit number. (i.e. TR-1A-01 or Room #216 – 01).

POWER AND CONTROL WIRE IDENTIFICATION
Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams or equipment manufacturer's shop drawings for control wiring.

All wiring shall be labeled within 2 to 4 inches of terminations. Each end of a wire or cable shall be labeled as soon as it is terminated including wiring used for temporary purposes.

WIRING DEVICE IDENTIFICATION
Wall switches, receptacles, occupancy sensors, wall dimmers, device plates and box covers, poke-through fittings, access floor boxes, photocells and time clocks shall be identified with circuit numbers and source. In exposed areas, identifications should be made inside of device covers, unless directed otherwise. Use machine-generated labels, or neatly hand-written permanent marker.

NAMEPLATE ENGRAVING
Provide nameplates of minimum letter height as scheduled below.

Panelboards, Switchboards and Motor Control Centers: 1 inch (25 mm); identify equipment designation. 1/2 inch (13 mm); identify voltage rating, source and room location of the source.

Equipment Enclosures: 1 inch (25 mm); identify equipment designation.

Circuit Breakers, Switches, and Motor Starters in Panelboards or Switchboards or Motor Control Centers: 1/2 inch (13 mm); identify circuit and load served, including location.

Individual Circuit Breakers, Disconnect Switches, Enclosed Switches, and Motor Starters: ½ inch (13 mm); identify source and load served.

Transformers: 1 inch (25 mm); identify equipment designation. 1/2 inch (13 mm); identify primary and secondary voltages, primary source, and secondary load and location.

Junction boxes: 1 inch (25 mm); identify system source(s) and load(s) served. Junction boxes may be neatly identified using a permanent marker.

PANELBOARD DIRECTORIES
Typed directories for panels must be covered with clear plastic, have a metal frame. Room number on directories shall be Owner's numbers, not Plan numbers unless Owner so specifies.

END OF SECTION 260553

SECTION 262416 – PANELBOARDS

PART 1 - GENERAL

SCOPE
The work under this section includes main, distribution and branch circuit panelboards.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

SUBMITTALS
Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, and circuit breaker arrangement and sizes.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section 010000 General Requirements.

SPARE PARTS
Keys: Furnish 2 keys for each panelboard to Owner.

PART 2 - PRODUCTS

BRANCH CIRCUIT PANELBOARDS
Lighting and Appliance Branch Circuit Panelboards: Circuit breaker type.

Enclosure: Type 1Minimum cabinet size: 5-3/4 inches (144 mm) deep; 20 inches (508 mm) wide with 5" minimum gutter space top and bottom. Constructed of galvanized code gauge steel. Panel enclosure (back box) shall be of non-stamped type (without KO's) to avoid concentric break out problem.

Provide surface cabinet front with concealed trim clamps, concealed hinge and flush cylinder lock all keyed alike. Front cover shall be hinged to allow access to wiring gutters without removal of panel trim. Hinged trim shall be held in place with screw fasteners. Finish in manufacturer's standard gray enamel.

Provide metal directory holders with clear plastic covers.

Provide panelboards with copper bus (phase buses, bus fingers, etc.), ratings as scheduled on Drawings. Provide ground bars in all panelboards. Neutral and ground bars can be dual rated ALCU9. All spaces shall have bus fully extended and drilled for the future installation of breakers.

Minimum System (i.e. individual component) Short Circuit Rating: As shown on the Drawings.

Molded Case Circuit Breakers: Bolt on type thermal magnetic trip circuit breakers. Provide UL Class A ground fault interrupter circuit breakers where shown on Drawings. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.

Do not use tandem circuit breakers.

Circuit breakers shall be bolt-on type with common trip handle for all poles. No handle ties of any sort will be approved.

All of the panelboards provided under this section shall be by the same manufacturer.

PART 3 - EXECUTION

INSTALLATION

See section 26 05 29 for support requirements.

Install panelboards plumb with wall finishes.

Height: 6 ft (2 m) to top.

Install a crimp type stud termination to stranded conductor when terminating on circuit breakers without a captive assembly rated for terminating stranded conductors.

Provide filler plates for unused spaces in panelboards.

See section 26 05 53 for identification requirements. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

Stub three empty ¾" conduits to accessible location above ceiling or below floor out of each recessed panelboard. Cap these conduits to prevent material from entering them.

FIELD QUALITY CONTROL

If aluminum conductors size #1/0 and larger (per Section 260519) are to be used as panelboard feeders, it is the responsibility of the contractor to provide panelboards with adequate wire bending space to accommodate the aluminum conductors and terminators to meet allowable code requirements. The Contractor shall circuit the panelboards as shown on the drawings. Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 10 percent, rearrange circuits in the panelboard to balance the phase loads within 10 percent.

Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections.

CONSTRUCTION VERIFICATION ITEMS
Contractor is responsible for construction verification of existing conditions.

END OF SECTION 262416

SECTION 262702 – EQUIPMENT WIRING SYSTEMS

PART 1 - GENERAL

SCOPE
The work under this section includes electrical connections to equipment specified under other Divisions and/or Sections, or furnished by Owner, including, but not limited to:

- HVAC motors, VFDs, and panels
- Plumbing motors, VFDs, and panels

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

Section 260533 – Raceway and Boxes for Electrical Systems.
Section 260519 – Low-Voltage Electrical Power Conductors and Cables.

SUBMITTALS
Product Data: Provide data for cord and wiring devices.

COORDINATION
Coordinate all equipment requirements with the various contractors and the Owner. Review the complete set of drawings and specifications to determine the extent of wiring, starters, devices, etc., required.

PART 2 - PRODUCTS

CORDS AND CAPS
Straight blade Attachment Plug: NEMA WD 1.

Locking blade Attachment Plug: NEMA WD 5.

Attachment Plug Configuration: Match receptacle configuration at outlet provided for equipment.

Cord Construction: Oil resistant thermoset insulated multiconductor flexible cord with identified equipment grounding conductor, suitable for hard usage in damp locations.

Cord Size: Suitable for connected load of equipment and rating of branch circuit overcurrent protection.

OTHER PRODUCTS
Refer to related sections for other product requirements.

PART 3 - EXECUTION

INSPECTION
Verify that equipment is ready for electrical connection, wiring, and energization.

PREPARATION
Review equipment submittals prior to installation and electrical rough in. Verify location, size, and type of connections. Coordinate details of equipment connections with supplier and installer.

INSTALLATION
Use wire and cable with insulation suitable for temperatures encountered in heat producing equipment.

Make conduit connections to equipment using flexible PVC-coated metal conduit.

Install pre finished cord set where connection with attachment plug is indicated or specified, or use attachment plug with suitable strain relief clamps.

Provide suitable strain relief clamps for cord connections to outlet boxes and equipment connection boxes.

Make wiring connections in control panel or in wiring compartment of pre wired equipment in accordance to manufacturer's instructions. Provide interconnecting wiring where indicated.

Install disconnect switches, controllers, control stations, and control devices such as limit switches and temperature switches as indicated. Connect with conduit and wiring as indicated.

HVAC AND PLUMBING CONNECTIONS
Provide all power wiring including all circuitry carrying electrical energy from panelboard or other source through starters, variable frequency drives (VFDs), and disconnects to motors or to packaged control panels. Packaged control panels may include disconnects and starters and overcurrent protection. Provide all wiring between packaged control panels and motors.

VFD Installations: Install VFD input wiring and output wiring in separate conduit systems. Do not mix VFD input power and output power, or control wiring in a common raceway.

Provide 120 volts to each temperature control panel. Coordinate requirements with HVAC/DDC contractors.

Unless otherwise specified, all electrical motors and control devices such as aquastats, float and pressure switches, solenoid valves and damper motors requiring mechanical connections shall be furnished and installed and wired by the Contractor supplying the devices.

Each motor terminal box shall be connected with a minimum 12", maximum 36" piece of flexible PVC-coated metal conduit to a fixed junction box. Conduit must be installed perpendicular to direction of equipment vibration to allow conduit to freely flex.

Check for proper rotation of each motor.

END OF SECTION 262702

SECTION 262726 – WIRING DEVICES

PART 1 - GENERAL

SCOPE
The work under this section includes wall switches, receptacles, occupancy sensors, wall dimmers, device plates and box covers, access floor boxes, photo cells and time clocks.

Related work
Applicable provisions of Division 1 govern work under this Section.

SUBMITTALS
Provide product data showing model numbers, configurations, finishes, dimensions, and manufacturer's instructions.

For occupancy sensor shop drawings, the manufacturer’s actual layout of occupancy sensors and the wiring diagrams shall be provided.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section 010000 General Requirements.

PART 2 - PRODUCTS

WALL SWITCHES
Wall Switches for Lighting Circuits : Heavy duty use toggle switch, rated 20 amperes and 120/277 volts AC. Switches shall be UL20 Listed and meet Federal Specification WS-896. All switches shall be heavy duty Specification Grade with separate green ground screw.

All switches shall be back and side wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG. Switches shall be Leviton model 1221-S, Hubbell model CS1221, Pass & Seymour model CSB20, Cooper model CSB120, or approved equal.

Handle: Ivory , made of nylon or high impact resistant material.

RECEPTACLES
Convenience and Straight blade Receptacles: NEMA Type 5 20R, ivory nylon or high impact resistant face. Receptacles shall be UL498 Listed and meet Federal Specification WC-596. All duplex receptacles shall be heavy duty Specification Grade, 20 amp rated. All receptacles shall be back and side wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with a separate green ground screw. Receptacles shall be Leviton model 5362-S, Hubbell model CR5362, Pass & Seymour model CRB5362, Pass & Seymour model PT5362 with 90º connector, Cooper model 5362, or approved equal.

Generally, all receptacles shall be duplex convenience type unless otherwise noted.

All receptacles installed in outdoor locations, in garages, within 6 feet of the outside edge of sinks, and in other damp or wet locations shall be GFCI type.

GFCI Receptacles: Duplex convenience receptacle, Specification Grade, with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A and UL standard 498. GFCI receptacles shall be Leviton model 8899, Hubbell model GRF5352, Pass & Seymour model 2095, Cooper model VGF20 or approved equal.

All receptacles on emergency circuits shall have a red face.

All receptacles designated as isolated ground shall have an isolated ground triangle imprint on the face of the receptacle.

Locking Blade Receptacles: As indicated on drawings.

Specific use Receptacle Configuration: As indicated on drawings.

OCCUPANCY SENSORS
All occupancy sensors shall be hardwired type; battery type shall not be permitted.

Wall Mounted (Wall Switch Type)
The sensor shall use either passive infrared or, if dual technology, passive infrared and passive acoustic sensing, or passive infrared and ultrasonic, for detecting room occupancy. The unit shall fit in/on a standard single gang switch box.

Rated capacity: 600 watts minimum at 120 volts, 60 Hz; 1000 watts minimum at 277 volts, 60 Hz

Sensitivity shall be user adjustable or self adjusting type.

The delay timer shall be adjusted within a range of 6 to 30 minutes by the contractor in the field. The sensor shall have a test mode for performance testing.

The off switch shall have manual override for positive off and automatic on.

The test LED shall indicate motion.

The area of coverage shall be approximately 180 degrees by 35-40 feet.

The unit shall have a five year warranty.

Ceiling Mounted
The sensor shall use either passive infrared or, if dual technology, passive infrared and passive acoustic sensing, or passive infrared and ultrasonic, for detecting room occupancy. The unit shall fit in/on a standard octagon box. All ceiling mounted sensors shall be installed to a box with ring and box support.

Rated capacity shall be 20 amps at 120 or 277 volts, for fluorescent lamps. Provide power pack as required for low voltage sensors.

Sensitivity shall be user adjustable or self adjusting type.

The delay timer shall be adjusted within a range of 6 to 30 minutes by the contractor in the field. The sensor shall have a test mode for performance testing.

The coverage area shall be 360 degrees by approximately 15 feet radius when mounted at 9 foot height. The sensor shall have provisions, such as masking, to block out problem areas.

Test LED to indicate motion.

The unit shall have a five year warranty.

See drawings for actual type of sensor.

WALL DIMMERS
Wall Dimmers: linear slide semiconductor type.

Rating: 600 Watts minimum, larger size to accommodate load shown on Contract Drawings.

DEVICE PLATES AND BOX COVERS
Decorative Cover Plate: Ivory smooth thermoplastic nylon. Note requirement for red plates on emergency outlets.

Weatherproof Cover Plate: Gasketed metal with hinged device covers.
Surface Cover Plate: Raised galvanized steel.

PHOTO CELLS
The controller shall be rated 2000 watts tungsten at 120, 240 or 277 volts. The cell shall be cadmium sulfide, 1" diameter.

The enclosure shall be die cast zinc, gasketed for maximum weather proofing.

The enclosure shall include the positioning lug on the top of the enclosure.

The unit shall have a delay of up to two minutes to prevent false switching. ON/Off adjustment shall be done by moving a light selector with a range from 2 to 50 foot-candles.

Mounting shall be for a 1/2" conduit nipple.

The unit shall have a 5 year warranty.

The contacts shall be SPST normally closed.

The operational temperature range shall be -40 to 140 degrees F(-40 to +60 degrees C).

PART 3 - EXECUTION

INSTALLATION

Install wall switches 48 inches (1.2 m) above floor, OFF position down.

Install wall dimmers 48 inches (1.2 m) above floor; de-rate ganged dimmers as instructed by manufacturer; do not use common neutral.

Install convenience receptacles 18 inches (450 mm) above floor, 4 inches above counters, grounding pole on bottom.

Install box for information outlet 18 inches (450 mm) above finished floor. Install box for telephone jack for wall telephone 48 (1.2 M) above finished floor.

Install specific use receptacles at heights shown on Contract Drawings.

Drill opening for poke through fitting installation in accordance to manufacturer's instructions.

Install decorative plates on switch, receptacle, and blank outlets in finished areas.

Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

Install devices and wall plates flush and level.

Receptacles shall have a bonding conductor from grounding terminal to the metal conduit system. Self-grounding receptacles using mounting screws as bonding means are not approved.

FIELD QUALITY CONTROL

Inspect each wiring device for defects.

Operate each wall switch and sensor with circuit energized and verify proper operation.

Verify that each receptacle device is energized.

Test each receptacle device for proper polarity.

Test each GFCI receptacle device for proper operation.

The user agency and WisDOT personnel reserve the right to be present at all tests.

OCCUPANCY SENSORS

Power packs used in return air plenum ceiling areas shall be installed in an approved enclosure or UL listed for return air plenum.

Provide a minimum of 4' of coiled cable for ceiling-mounted sensors.

Sensitivity Test: After the sensor has been energized for at least 15 minutes, walk to the middle of the room (if conference room) or sit at the normal desk position (if and office). Make no motion for 20 seconds. Move one arm up and down slowly. The test LED should blink.

Time Delay Test: Set the time delay for 10 minutes. Walk into the room to activate the sensor then leave room. Sensor must turn lights off at approximately 10 minutes. Walk into the room again to reactivate the lights. Lights should activate within 1 second.

For lights on emergency power without a remote transfer device, route the emergency circuit through a separate relay controlled by the occupancy sensor(s) in the respective area. For lights on emergency power with a remote transfer device, the emergency power does not get routed through the occupancy sensor relay, but the normal power does get routed through the occupancy sensor relay.

ADJUSTING

Adjust devices and wall plates to be flush and level.

Mark all conductors with the panel and circuit number serving the device with a machine generated label, at the device, and on the back of the device cover.

END OF SECTION 262726

SECTION 262728 – DISCONNECT SWITCHES

PART 1 - GENERAL

SCOPE
The work under this section includes disconnect switches, fuses and enclosures.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

SUBMITTALS
Include outline drawings with dimensions, and equipment ratings for voltage, ampacity, horsepower, and short circuit.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section 010000 General Requirements.

PART 2 - PRODUCTS

DISCONNECT SWITCHES
Fusible Switch Assemblies (use only when overcurrent protection is required): NEMA Type 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. Handle lockable in OFF position. Fuse Clips: designed to accommodate Class R cartridge type fuses.

Nonfusible Switch Assemblies: NEMA Type 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. Handle lockable in OFF position.

Enclosure: NEMA Type 1. 3R. as required by environmental conditions or as indicated on Drawings.

Provide manufacturer’s equipment ground kit in all disconnect switches.

FUSES
Fuses 600 Amperes and Less: Dual element, time delay, 250 volt, UL Class RK 1. RK 5. Interrupting Rating: 200,000 rms amperes.

PART 3 - EXECUTION

INSTALLATION

Install disconnect switches where indicated on Drawings.

Provide identification as specified in Section 260553.

END OF SECTION 262728

SECTION 262813 – FUSES

PART 1 - GENERAL

SCOPE
The work under this section includes 250 volt fuses.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

SUBMITTALS
Provide device dimensions, nameplate nomenclature, and electrical ratings.

Submit manufacturer’s product data sheets with installation instructions.

REGULATORY REQUIREMENTS
Listed by Underwriter's Laboratories, Inc., and suitable for specific application.

EXTRA MATERIALS
Provide three spares of each size and type fuse.
PART 2 - PRODUCTS

250 VOLT FUSES
Fuses 600 Amperes and Less: Dual element, time delay, 250 volt, UL Class RK 1. RK 5.
Interrupting Rating: 200,000 rms amperes.

PART 3 - EXECUTION

INSTALLATION
Fuses shall not be installed until equipment is ready to be energized.

Install spare fuse storage enclosure in Electrical Room.

END OF SECTION 262813

SECTION 262900 – LOW-VOLTAGE CONTROLLERS

PART 1 - GENERAL

SCOPE
The work under this section includes manual motor starters, magnetic motor starters, combination magnetic motor starters and motor control centers.

RELATED WORK
Applicable provisions of Division 1 shall govern work under this Section.

Section 260529 – Hangers and Supports for Electrical Systems.

COORDINATION WITH OTHER TRADES
Motors: In general, all electric motors required for this installation will be supplied with equipment, apparatus and/or appliances covered under other sections of the specifications.

For the sake of consistency and conformity of manufacturer, design and construction, all motors shall conform to the following description unless otherwise noted or required.

- Motors 1/3 HP and smaller shall be wound for operation on single phase, 60 Hz. service unless otherwise noted.
- Motors 1/2 HP and above shall be wound for operation on 3 phase, 60 Hz service unless otherwise noted.
- Refer to drawings in each case in order to verify voltage characteristics required.

Equipment:
All building utility motors such as fans, pumps, overhead doors, etc., together with certain "controlling equipment" for same, except motor starters and related apparatus, will be furnished under other sections of the specifications and delivered to the building site unless specifically noted otherwise. The above mentioned "controlling equipment" pertains to electrical thermostats, electro-pneumatic and pneumatic-electric and detection devices, or any other device not purely electrically operating in nature.

The starters for these motors shall be furnished and installed by the Electrical Trade unless noted otherwise. (See Motor Schedule on Drawings.)

The Electrical Trade shall set and connect all specified starting equipment, install all power conduits and wiring and shall furnish and make all connections from starting equipment to motors as required to leave the apparatus in running condition.

Wiring Connections:
Furnish branch circuits for all motors to the starting equipment and then to the motors, complete with all control wiring for automatic and remote control where required or

noted. Conduits to motors shall terminate in the conduit fittings on the motors, the final connection being made with flexible, PVC-coated metal conduit.

Provide all necessary labor and material to completely connect all electrical motors and controls (where required) in connection with the building utility equipment, including fans, pumps, overhead door operators, etc.

All conduits and wiring required for control work from the holding coil circuit of the starter, including the furnishing and installation of control devices such as auxiliary contacts, control relays, time delay relays, pilot lights, selector switches, alternators, etc., shall be provided and installed by other trades unless otherwise indicated.

Power Branch Circuits:
Wire sizes for branch circuits not specifically called for on drawings or in specifications shall be based on 125 percent of the full load current of the motor unless the voltage drop of motor branch circuits exceeds 1-1/2 percent from the distribution panel to the motor; in which case, voltage drop shall govern wire sizes. A power factor of 80 percent shall be used for motors in such calculations.

REFERENCES

ANSI/NEMA ICS	Enclosures for Industrial Controls and Systems.
ANSI/UL 198E	Class R Fuses.
NEMA AB 1	Molded Case Circuit Breakers.
NEMA ICS 2	Industrial Control Devices, Controllers, and Assemblies.
NEMA KS 1	Enclosed Switches.
NEMA PB 1	Panelboards.
NEMA PB 1.1	Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

SUBMITTALS
Indicate on shop drawings, front and side views of motor control center enclosures with overall dimensions. Include conduit entrance locations and requirements; nameplate legends; size and number of bus bars per phase, neutral and ground; electrical characteristics including voltage, frame size and trip ratings, withstand ratings, and time current curves of all equipment and components.

Provide product data on motor starters and combination motor starters, relays, pilot devices, and switching and overcurrent protective devices.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section 010000 General Requirements.

DELIVERY, STORAGE, AND HANDLING
Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

Handle in accordance to manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to motor control center components, enclosure, and finish.

SPARE PARTS
Keys: Furnish two each to Owner.

Provide three spares of each size and type fuse used. Provide enclosure for spare fuses.

Fuse Pullers: Furnish one fuse puller to Owner.

PART 2 - PRODUCTS

MANUAL MOTOR STARTERS
Manual Motor Starter: NEMA ICS 2; size as shown on Drawings. AC general purpose Class A manually operated full voltage controller for induction motors rated in horsepower, with overload protection, red pilot light and toggle operator.

Enclosure: NEMA Type: As required of indicated on the drawings.

Provide manufacturer’s equipment ground kit in all starter enclosures.

MAGNETIC MOTOR STARTERS
Magnetic Motor Starters: NEMA ICS 2; AC general purpose Class A magnetic controller for induction motors rated in horsepower; size 0 minimum.

Full Voltage Starting: Non reversing type.

Size: NEMA ICS 2; size as shown on Drawings, size 0 minimum.

Coil Operating Voltage: 120 volts, 60 Hz.

Overload Protection: bimetal or melting alloy.

Enclosure: NEMA Type: As required or indicated on the drawings.

Provide manufacturer’s equipment ground kit in all starter enclosures.

FUSES
Fuses 600 Amperes and Less: Dual element, time delay, 250 volt, UL Class RK 1. RK 5. Interrupting Rating: 200,000 rms amperes.

PART 3 - EXECUTION

INSTALLATION

Install motor control equipment in accordance to manufacturer's instructions.

Motor Starter Panelboard Installation: In conformance with NEMA PB 1.1.

Select and install heater elements in motor starters to match installed motor characteristics.

Motor Data: Provide neatly typed label inside each motor starter enclosure door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating.

END OF SECTION 262900

SECTION 263600 – TRANSFER SWITCHES

PART 1 - GENERAL

SCOPE
The work under this section includes transfer switches (less than 600V) for Future standby generator systems.

RELATED WORK
Applicable provisions of Division 1 govern work under this section.

QUALITY ASSURANCE
Manufacturer: Company specializing in automatic transfer equipment with five years documented experience.

SUBMITTALS
Submit product data showing overall dimensions, electrical connections, electrical ratings, all specified accessories, interlock methods, and environmental requirements.

Submit manufacturer's installation instructions.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section 010000 General Requirements.

In addition to the general content specified under Section 010000 General Requirements, supply the following additional documentation:

Instructions for operating equipment under test and emergency conditions.

PART 2 - PRODUCTS

AUTOMATIC TRANSFER SWITCH
Description: NEMA ICS 2; automatic transfer switch. The switch shall be rated 600 amps, as suitable for use as a service disconnecting means.

Configuration: The transfer switch shall be electrically operated and mechanically held. The electrical operation shall be by a solenoid mechanism operating from the same source to which the load is being transferred.

The switch shall be rated for continuous duty and be mechanically interlocked to be in either the normal or the emergency position.

The switch shall be controlled by electronic solid state components with printed circuit control boards, and industrial grade plug in control relays.

The switch shall be designed and built so that it can be manually operated under no-load conditions from behind a barrier partition or with the door closed. The enclosure shall allow for inspection of the internal operation of the switch through a full sequence of the transfer cycle with the door open and the switch de-energized.

RATINGS
Ratings: 600 Amp, 3 Pole, 4 Wire, NEMA 3R.

AUTOMATIC SEQUENCE OF OPERATION
Initiate Time Delay to Start Alternate Source Engine Generator: Upon initiation by normal source monitor.

Time Delay to Start Alternate Source Engine Generator: 0 to 10 seconds, adjustable.

Initiate Transfer Load to Alternate Source: Upon initiation by normal source monitor and permission by alternate source monitor.

Time Delay Before Transfer to Alternate Power Source: 0 to 60 seconds, adjustable.

Initiate Re-transfer Load to Normal Source: Upon permission by normal source monitor.

Time Delay Before Transfer to Normal Power: 0 to 30 minutes adjustable.

Time Delay Before Engine Shut Down: 0 to 30 minutes, adjustable, unloaded operation.

Operating transfer time of the switch in either direction shall not be greater than 1/6 of a second.

Engine Exerciser: Digital control, - start engine every 7 to 30 days adjustable; run for 0 to 120 minutes adjustable, before shutting down. Bypass exerciser control if normal source fails during exercising period.

ACCESSORIES
Manual Operator: Provide manual operator to allow switch to be operated under no-load conditions from behind a barriered partition or with the door closed.

Indicating Lights: LED type. Mount in cover of enclosure to indicate NORMAL SOURCE AVAILABLE, ALTERNATE SOURCE AVAILABLE, SWITCH POSITION.

Test Switch: Mount in cover of enclosure to simulate failure of normal source by interrupting the power signal to the normal source monitor.

Return to Normal Switch: Mount in cover of enclosure to initiate manual transfer from alternate to normal source.

Transfer Switch Auxiliary Contacts: Minimum 2 normally open; 2 normally closed.

Normal Source Monitor: Monitor each line of normal source voltage; adjustable set points; initiate transfer when voltage drops below 85 percent.

Alternate Source Monitor: Monitor alternate source voltage and frequency; adjustable set points; inhibit transfer when voltage is below 85 percent or frequency varies more than 3 Hertz from rated nominal voltage.

The switch shall contain an in-phase monitor or adjustable time delay transition to inhibit closing of the switch into high levels of motor residual voltage.

A factory installed equipment ground bar shall be provided in each switch enclosure.

Three-pole transfer switches shall contain a factory installed fully rated solid neutral lug assembly.

Provide digital metering on all transfer switches 200A and larger. Metering shall provide, at a minimum, measurement of voltage, current and kW demand for each phase on the load side of the switch.

PART 3 - EXECUTION

INSTALLATION

Install in accordance to manufacturer's instructions.

Starting contacts for all transfer switches shall be wired in parallel to the generator starting circuit so that any transfer switch that senses a loss of normal power will start the generator. This includes contacts as part of the fire pump controller. This control wiring is not shown on the plans but is required to be provided by the electrical contractor.

FIELD ADJUSTMENTS

The contractor shall field adjust all timing and voltage settings of the transfer switch as necessary for proper operation of the switch, related loads and sources.

AGENCY TRAINING

All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 017900.

END OF SECTION 263600

SECTION 264313 – SURGE PROTECTIVE DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

SCOPE
The work under this section includes Surge Protective Devices (SPD) as indicated on the project drawings and electrical diagrams.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS
UL 1449, Third Edition – Standard For Safety For Surge Protective Devices.
ANSI/IEEE C62.41.1 Guide on the Surge Environment in Low-Voltage AC Power Circuits.
ANSI/IEEE C62.41.2 Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.
ANSI/IEEE C62.45 Recommended Practice on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits.
IEEE C62.62 Standard Test Specification for Surge Protective Devices For Low-Voltage AC Power Circuits.
Military Standard 220B
NFPA 70, NEC Article 285

QUALITY ASSURANCE
The manufacturer shall have been in the Surge Protective Device industry for a minimum of 5 years.

WARRANTY
The manufacturer shall provide a minimum 5 year warranty from the date of shipment of the SPD.

SUBMITTALS
Include all SPD data necessary to show device is in compliance with all product specifications. Include product data sheets showing the device performance, dimensions, weight, connections, and mounting requirements, along with installation instructions.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section 010000 General Requirements.

PART 2 - PRODUCTS

SURGE PROTECTIVE DEVICES

The SPD shall be Listed in accordance to UL 1449, Third Edition. The product and ratings shall be included in the database of the UL.com web site.

The surge protective device (SPD) shall be designated a location Type 1 or Type 2 device intended for installation on the load side of the service equipment overcurrent device, including SPDs located at the branch panel.

The SPD shall be connected in parallel with the facility's electrical system.

The SPD shall be made up of metal oxide varistors (MOV's), or a combination of MOV's with selenium cells or silicon avalanche diodes, ensuring that all of the performance requirements are met. Gas tubes shall not be used.

The entire SPD shall be enclosed in a metal or ABS enclosure, NEMA rated for the location. SPDs at main service equipment shall be mounted outside the switchboard or panelboard (not integral to, or installed within the switchboard or panelboard). SPDs for branch panelboard (2nd tier) locations may be mounted outside of, or integral to, the branch panelboard.

The SPD shall have a maximum continuous operating voltage (MCOV) rating not less than 115% of nominal voltage of the system it is protecting.

Protection Modes:
The SPD shall have line to neutral (L-N), line to ground (L-G), line to line (L-L) and neutral to ground (N-G) protection modes for grounded wye configured systems. For a delta configured system, the device shall have line to line (L-L) and line to ground (L-G) protection modes.

Voltage Protection Rating (VPR):
The UL 1449 Voltage Protection Rating (VPR) for the device shall not exceed the following:

208Y/120 volt applications: 900V L-N, L-G, N-G; 1200V L-L
480Y/277 volt applications: 1200V L-N, L-G, N-G; 2000V L-L
480 volt delta applications: 1800V L-G, 2000V L-L

Nominal Discharge Current (In):
The SPD shall have a UL 1449 Nominal Discharge Current Rating (In) of not less than 20kA.

Short Circuit Current Rating (SCCR):
The SPD shall have a UL 1449 Short Circuit Current Rating (SCCR) of not less than 200kA.

Single Impulse Surge Current Rating:
The single-pulse (8 X 20 microsecond waveform as specified in ANSI/IEEE Standard C62.41) surge current capacity shall not be less than the following:

100 kA per mode for service entrance, switchboard, and main distribution panel locations
50 kA per mode for branch panelboard (2nd tier) locations

Electrical Noise Filtering:
The SPD shall contain an EMI/RFI noise filter with minimum attenuation of -50dB at 100 kHz, tested per MIL-STD-220B.

Each SPD shall include externally-mounted LED visual status indicators that indicate the on-line status of the unit, for each phase.

Each SPD shall be provided with audible diagnostic monitoring by way of audible alarm with on/off silence function.

Each SPD shall be provided with one set of NO/NC dry contracts for alarm conditions.

PART 3 - EXECUTION

INSTALLATION

Install SPD units in accordance to manufacturer's written instructions, applicable requirements of NEC and NEMA standards, and recognized industry practices.

The SPD units shall be installed at the locations shown on the drawings, or as indicated in the one-line diagram. They shall be parallel-connected to, and located adjacent to the switchboard or panelboard being protected. Locate as close as practical to the bus, keeping lead length as short as possible (less than 3 feet preferred).

SPDs shall be connected through a multi-pole circuit breaker or fused disconnect switch, not into main lugs. Circuit breaker or fused disconnect switch shall be 60A for main service device, 30A for branch panelboard device or as recommended by the manufacturer.

Use schedule 40 PVC conduit or metallic conduit between the SPD and the switchboard or panelboard as recommended by the manufacturer. Avoid sharp bends, excess length, and splices in the wires. Where possible, use a close-nippled connection with wires going directly to a circuit breaker within the switchboard or panelboard.

Setup and test per the manufacturer's recommendations.

AGENCY TRAINING

All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 017900.

END OF SECTION 264313

SECTION 265113 – INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS

PART 1 - GENERAL

SCOPE
The work under this section includes interior luminaires and accessories, exit signs, lamps, and ballasts.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

SUBMITTALS
Include outline drawings, lamp and ballast data, support points, weights, accessory information and performance data for each luminaire type.

For each luminaire type, submit luminaire information in the following example table format, and submit catalog cuts with highlighted catalog numbers and required accessories.

LUMINAIRE		BALLAST	LAMP	ANSI INPUT WATTS
Type	Manufacturer and Catalog No.	Manufacturer, Quantity per Fixture, and Catalog No.	Manufacturer, Quantity per Fixture, and Catalog No.	

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section 010000 General Requirements.

EXTRA MATERIAL
Provide 10 percent of each lamp type, but not less than one of each type.

Provide three percent of each ballast type, but not less than one ballast of each type.

PART 2 - PRODUCTS

INTERIOR LUMINAIRES AND ACCESSORIES
See the Lighting Fixture Schedule on the drawings, for type of fixtures and catalog numbers. Catalog numbers are shown on the drawings for quality and performance requirements only. Fixtures manufactured by others are equally acceptable provided they meet or exceed the performance of the indicated fixtures, and meet the intent of the design.

Provide fluorescent fixtures with quick-connect disconnecting means, similar to Thomas & Betts Sta-Kon.

Fluorescent T8 lamps and ballasts shall be listed on CEE high-performance qualifying product list and approved by Focus–On–Energy.

LAMPS

Four Foot Fluorescent Lamps: High Performance T8 Lamps:

- Minimum 3000 initial lumens and minimum of 2820 mean lumens.
- Minimum 24,000 hour rated life at three-hour starts.
- Color Rendering Index (CRI) of 81 or higher.
- 5000ºK color temperature.
- Lamps shall be suitable for use with instant start ballasts and occupancy sensors.
- Lamps shall meet "TLCP" requirements for low mercury.
- Mean system efficiency equal to 90MLPW minimum, with instant start ballasts.

Acceptable lamp manufacturers and catalog numbers are (or equal):
PHILIPS - F32T8/ADV85/ALTO
GE - F32T8/XL/SPX50/HL/ECO
SYLVANIA - F032/850/XPS/ECO3
SLI LIGHTING - F32T8/HL/850
STANDARD PRODUCTS - F32T8/850/XL31
MAXLITE - F32T8/850XL
TECHNICAL CONSUMER PRODUCTS, INC. - F32T8/850/HL

Manufacturer names and catalog numbers are used to develop quality and performance requirements only. Lamps manufactured by others will be accepted provided they meet or exceed the specifications.

Compact Fluorescent Lamps:
Compact fluorescent lamp temperature shall be 5000ºK with a color rendering index (CRI) at or above 80. See lighting fixture schedule on drawings.

HID Lamps:
Metal halide HID lamps shall be pulse-start, clear coated, suitable for all burning positions, and shall have a maintenance factor of 0.75 or greater and CRI of 65 or higher. High pressure sodium lamps shall be clear coated and suitable for all burning positions. See lighting fixture schedule on drawings.

All lamps shall be new.

FLUORESCENT BALLASTS

All fluorescent ballasts shall be electronic type and shall meet the following specs:

- UL Listed (Class P) sound rating A and CSA certified.
- Comply with EMI and RFI limits set by the FCC (CFR 47 part 18) or NEMA and not interfere with normal electrical equipment.
- Meet any applicable standards set forth by ANSI.
- Be potted or conformal coated in a metallic case and not contain PCBs.
- Provide normal rated lamp life as stated by lamp manufacturers (i.e. rated life at 3 hour burn time per start).
- Provide independent test results from an approved testing laboratory for all of the specifications below. This is required for all submitted ballasts.
- Nominal power factor of .90 or higher.
- Total harmonic distortion of less than 10% at 120 or 277 volts (universal voltage).
- Ballast factor 0.70 through 1.2, as shown on the lighting fixture schedule.
- Frequency of operation shall be 40 kHz - 50 kHz and units shall operate without visible flicker.
- Ballast efficiency factor shall meet Consortium of Energy Efficiency (www.cee1.org) specifications (adopted by Focus on Energy program).
- Multi-lamp ballasts shall operate in parallel so that when one lamp burns out, the other lamps will continue to operate at full light output.
- Ballast Efficiency Factor (BEF) shall be as shown in the table below.

Number of Lamps	Low (BF ≤ 0.85)	Normal (0.85 < BF ≤ 1)	High (BF > 1.0)
INSTANT – START BALLASTS (T8 lamps)			
1	≥ 3.08	≥ 3.11	N.A.
2	≥ 1.60	≥ 1.58	≥ 1.55
3	≥ 1.04	≥ 1.05	≥ 1.04
4	≥ 0.79	≥ 0.80	≥ 0.77
PROGRAMMED – START BALLASTS (T5 lamps)			
1	≥ 2.85	≥ 2.84	N.A.
2	≥1.48	≥1.47	≥ 1.51
3	≥ 0.97	≥ 1.00	≥ 1.00
4	≥ 0.76	≥ 0.75	≥ 0.75

- Ballasts shall carry a minimum 5 year warranty with a $10 replacement labor allowance.
- Ballasts shall not be affected by lamp failure.
- Ballasts shall be a standard production item.

- Ballasts shall be marked with manufacturer's name, part number, supply voltage, power factor, open circuit voltage, current draw for each lamp type and UL Listing.
- Ballasts shall withstand line transients as defined in IEEE 587, Category A.
- SYSTEM PERFORMANCE: System performance for instant-start ballasts shall be as follows:

1. Instant-Start, Low Ballast Factor (BF = 0.77-0.78)

Lamps	Nominal Lamp Watts	System Input Watts @ Univ Volt)
1 – F32T8	32	25
2 – F32T8	32	48
3 – F32T8	32	73
4 – F32T8	32	97

2. Instant-Start, Normal Ballast Factor (BF = 0.87-0.88)

Lamps	Nominal Lamp Watts	System Input (Watts @ Univ Volt)
1 – F32T8	32	28
2 – F32T8	32	56
3 – F32T8	32	83
4 – F32T8	32	109

- SYSTEM PERFORMANCE: System performance for programmed-start ballasts shall be as follows:

1. Programmed-Start, Low Ballast Factor (BF = 0.71)

Lamps	Nominal Lamp Watts	System Input (Watts @ Univ Volt)
1 – F32T8	32	25
2 – F32T8	32	47
3 – F32T8	32	73
4 – F32T8	32	93

2. Programmed-Start, Normal Ballast Factor (BF = 0.88)

Lamps	Nominal Lamp Watts	System Input (Watts @ Univ Volt)
1 – F32T8	32	31
2 – F32T8	32	88
4 – F32T8	32	118

Acceptable ballast manufacturer's names and product lines are as follows:
Osram Sylvania – Quicktronic High Efficiency and Quicktronic PROstart.
GE Lighting – Ultramax and UltraStart.
Maxlite – High Efficiency Ballast.
Advance – Optanium.
Universal Lighting Technologies – F32T8.

Manufacturer names are used to develop quality and performance requirements only. All manufacturers and their products shall meet the system performance requirements and this entire specification.

COMPACT FLUORESCENT BALLASTS (ELECTRONIC)

- Ballasts shall be high power factor, class P, with voltage rating matching the branch circuit voltage.
- Ballast factor shall be 0.85 or higher.
- Ballast shall have lamp fault shut-off circuitry to prevent starting of a faulty lamp.
- Cold-weather ballast must reliably start and operate the lamp in ambient temperatures down to 0ºF for the rated life of the lamp.

HID BALLASTS
Physical Requirements:

- Core and coil shall be vacuum impregnated with silica-filled polyester resin.
- Core and coil shall use pre-insulated individual input voltage leads; floating lead and tab terminals are not acceptable.
- Oil-filled capacitors shall be housed in corrosion-resistant steel or aluminum cans and contain ¼" quick disconnect terminals.
- Dry capacitors shall be housed in a flame-retardant thermoplastic case with lead wire terminations and have no exposed live parts.
- Igniters shall be polyester filled with either a plastic or aluminum external housing.
- HID ballast kits with igniters shall have the igniters pre-wired to the core and coil, and have push-in connectors installed on the core and coil "cap" leads.

Lighting Performance Requirements:

- Ballasts shall be designed to provide reliable lamp starting down to –40ºC for High Pressure Sodium, -30ºC for probe-start Metal Halide, and –30ºC / -40ºC for pulse-start Metal Halide lamps (depending on lamp specifications).

Electrical Performance Requirements:

- Capacitors shall be 100ºC dry type where rated voltage is ≤400, and contain bleeder resistors where required by UL. All oil -filled capacitors shall contain an internal protective device.

- Igniter shall be designed to operate an average of 10,000 hours at a case temperature of 75ºC.
- Igniter shall be 105ºC rated.

Regulatory Requirements:

- Ballast shall be designed and manufactured in accordance to the ANSI Standard for HID Ballasts, ANSI C82.4.
- Ballast shall be UL recognized in accordance to UL 1029 Standard for HID Ballasts or CSA certified in accordance to CAN/CSA-22.2 No. 74-92.
- Manufacturer shall provide written warranty against defects in workmanship for two years.

METAL HALIDE HIGH FREQUENCY ELECTRONIC BALLASTS

- Ballast variation in output power shall be +/- 0.5%.
- Ballast variation in input voltage shall be +/- 10%.
- Ballast shall be equipped with safety shutdown feature to prevent excessive pulsing of failed lamps.
- Ballast shall have Total Harmonic Distortion of less than 10%.
- Ballast power factor shall be greater than 0.95.
- Ballast shall be thermally protected to shut off when temperatures reach unacceptable levels.
- Ballast shall have an acceptable remote mounting distance of not less than 15 feet.

DIMMING BALLASTS (Fluorescent)

- Ballast shall provide continuous, flicker-free dimming from 100% to 5%.
- Ballast shall have Total Harmonic Distortion of less than 10%.
- Ballast power factor shall be greater than 0.95.
- Ballast factor shall be 0.85 or higher for T8 lamps, 0.95 or higher for T5 lamps.
- Ballast shall be high frequency electronic type and operate lamps at a frequency above 25kHz for T5 lamps.
- Ballast shall have built-in inrush current limiting circuitry, maximum of 7 amps for 120 volts and 3 amps for 277 volts.
- Ballast shall have internal fusing.
- Ballast shall have ultra-quiet operation.
- Operating temperature shall not exceed 75º C on the case during normal operation.
- Minimum lamp starting temperature shall be 10ºC / 50º F.

PART 3 - EXECUTION

INSTALLATION

Install in accordance to manufacturer's instructions.

Install suspended luminaires and exit signs using pendants supported from swivel hangers. Heavy duty jack chain supports may be used where indicated on the fixture schedule. Provide pendant or chain length required to suspend luminaire at indicated height.

Support luminaires larger than 2 x 4 foot (600 x 1 200 mm) size independent of ceiling framing.

Locate ceiling luminaires as indicated on reflected ceiling plan.

Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.

The Contractor shall install fixture supports as required. Fixture installations with fixtures supported only by insecure boxes will be rejected. It shall be the Contractor's responsibility to support all lighting fixtures adequately, providing extra steel work for the support of fixtures if required. Any components necessary for mounting fixtures shall be provided by the Contractor. No plastic, composition or wood type anchors shall be used.

Exposed Grid Ceilings: Provide auxiliary members spanning ceiling Ts to support surface mounted luminaires. Provide independent support for all fixtures over 50 lbs.

Install recessed luminaires to permit removal from below.

Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.

Install code required hardware to secure recessed grid supported luminaires in place.

Install wall mounted luminaires and exit signs at height as scheduled.

Install accessories furnished with each luminaire.

Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.

Bond fixtures and metal accessories to branch circuit equipment grounding conductor.

Install specified lamps in each luminaire and exit sign.

HID Luminaires: Use power hook hangers rated 500 pounds (225 kg) minimum or provide safety chain between ballast and structure. Provide safety chain between reflector and ballast.

All lamps shall be delivered to the job in sealed cartons and protected from dirt and dust during storage on the project. Lamps shall be taken directly from the cartons and installed in the fixture with special care so that they do not become dusty and are not soiled in the operation.

Lamps installed in fixtures using dimming ballasts shall be burned in at 100% rated output by the contractor for a minimum of 100 hours as recommended by the ballast manufacturer.

All new lamps shall be operational at the Substantial Completion of the project.

ADJUSTING AND CLEANING
Align luminaires and clean lenses and diffusers at completion of Work. Clean paint splatters, dirt, and debris from installed luminaires.

Aim and adjust luminaires as indicated on Drawings or as directed by the A/E.

Touch up luminaire finish at completion of work.

INTERFACE WITH OTHER PRODUCTS
Interface with air handling accessories furnished and installed under Division 23.

FIELD QUALITY CONTROL
Operate each luminaire after installation and connection. Inspect for proper connection and operation.

ALL FIXTURE CONNECTIONS INCLUDING MASTER-SLAVE
Direct box or conduit connections for surface and recessed fixtures. Flexible metal conduit from a J-box for recessed lay-in light fixtures. Flexible metal conduit shall be minimum 3/8" (10 mm) minimum diameter and six foot (1.8 M) maximum length. Flexible whip between master and slave fixtures may be supported off of the ceiling grid wires. Conduit length shall allow movement of the fixture for maintenance purposes. Minimum wire size shall be #18 AWG for single fixture or master-slave fixture.

The flexible connectors shall be all steel, galvanized, clamp type with locknut or snap-in connector including those used on the master-slave unit.

AGENCY TRAINING
All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 017900.

END OF SECTION 265113

SECTION 265629 – SITE LIGHTING

PART 1 - GENERAL

SCOPE
The work under this section includes exterior luminaires and accessories, poles, and foundations.

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

REFERENCES
COMM 53.28 - Pole foundations

SYSTEM DESCRIPTION
Parking area lighting

SUBMITTALS
Shop Drawings: Indicate dimensions and components for each luminaire, pole and base.

Product Data: Provide dimensions, ratings, performance data, lamp and ballast data, weights and accessory information for each type.

Manufacturer's Instructions:
Indicate application conditions and limitations of use stipulated by product testing agency specified under "Regulatory Requirements".

Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

Light Layout: Provide a computer generated factory point to point foot-candle layout of the project for each area involved.

Design Data: Include lighting calculations.

Post Installation Report: Provide to the Engineer and WISDOT the results of the measured foot-candle level for each area involved. Use a measuring device pre-approved by WISDOT.

PROJECT RECORD DOCUMENTS
Accurately record actual locations of each luminaire, pole and underground circuit.

Provide record drawings of the final, as installed and measured, point to point foot-candle layout for each area involved.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section 010000 General Requirements.

COORDINATION
Use bolt templates and pole mounting accessories to install anchor bolts in pole base.

EXTRA MATERIAL
Provide 10 percent of each lamp type, but not less than 1 of each type.

Provide 5 percent of total fuses provided for each size, but not less than 1 of each size.

Provide 3 percent of each ballast type, but not less than 1 ballast of each type.

PART 2 - PRODUCTS

LUMINAIRES
Furnish products as specified in schedule on Drawings.

HID BALLASTS
Physical Requirements:
Core and coil shall be vacuum impregnated with silica-filled polyester resin.
Core and coil shall use pre-insulated individual input voltage leads; floating lead and tab terminals are not acceptable.
Oil-filled capacitors shall be housed in corrosion-resistant steel or aluminum cans and contain ¼" quick disconnect terminals.
Dry capacitors shall be housed in a flame-retardant thermoplastic case with lead wire terminations and have no exposed live parts.
Igniters shall be polyester filled with either a plastic or aluminum external housing.
HID ballast kits with igniters shall have the igniters pre-wired to the core and coil, and have push-in connectors installed on the core and coil "cap" leads.

Lighting Performance Requirements:
Ballasts shall be designed to provide reliable lamp starting down to –40 degrees C for High Pressure Sodium, -30 degrees C for probe-start Metal Halide, and –30 degreeC/-40 degree C for pulse-start Metal Halide lamps (depending on lamp specifications).

Electrical Performance Requirements:
Capacitors shall be 100 degree C dry type where rated voltage is < 400, and contain bleeder resistors where required by UL. All oil filled capacitors shall contain an internal protective device.
Igniter shall be designed to operate an average of 10,000 hours at a case temperature of 75 degree C.
Igniter shall be 105 degree C rated.

Regulatory Requirements:
Ballast shall be designed and manufactured in accordance to the ANSI Standard for HID Ballasts, ANSI C82.4.
Ballast shall be UL recognized in accordance to UL 1029 Standard for HID Ballasts or CSA certified in accordance to CAN/CSA-22.2 No. 74-92.
Manufacturer shall provide written warranty against defects in workmanship for two years.

LAMPS
Provide lamp type specified for luminaire.

Metal Halide HID Lamps: See schedule.

High Pressure Sodium HID Lamps: See schedule. Suitable for all burning positions.

All lamps shall be new and by the same manufacturer.

FUSES
Furnish and install a fuse holder and fuse in each ungrounded leg of the electrical circuit supplying the outdoor luminaire. Every luminaire shall be separately fused with a waterproof fuse holder. Size the fuse for the amperage of the luminaire. Tap the circuit conductors with a minimum #10 AWG conductor to serve the luminaire. The fuse and holder shall be accessible through the handhole. Provide sufficient wire to bring fuse holder outside of handhole.

POLES
Furnish products as specified in schedule on Drawings.

Handhole: With removable weatherproof cover.

Anchor Bolts: As recommended by pole manufacturer. Provide template, flat washers, lock washers, and hex nuts for each pole.

POLE FOUNDATIONS
Construct from reinforced concrete in sizes as shown on drawings and to meet the minimum structural requirements of COMM.53.28 - Pole foundations.

Provide 3/4" X 10'0" ground rods in the pole foundation so that the ground rod projects 3" up into center of pole base.

The exposed surface area of the foundation shall have the forms removed and the concrete rubbed out to a smooth finish.

PART 3 - EXECUTION

INSTALLATION
Install in accordance to manufacturers' instructions.

Minimum underground conduit size is 1 inch.

Underground and exterior wire shall be type XHHW-2 or USE.

Project anchor bolts 2 inches (50 mm) minimum above base.

Install all anchor bolts and handhole fasteners with anti-seize compound.

Install poles plumb. Provide shims or double nuts to adjust plumb.

Use belt slings or non-chafing ropes to raise and set pre-finished luminaire poles.

Bond each luminaire, each metal accessory, the ground rod and the pole to the branch circuit equipment ground conductor with a separate ground wire sized per NEC or as shown on the drawings.

FIELD QUALITY CONTROL
Operate each luminaire after installation and connection. Inspect for improper connections and operation.

ADJUSTING
Aim and adjust luminaires as indicated on Drawings or as directed by the A/E.

All new lamps shall be operational at the Substantial Completion of the project.

CLEANING
Clean photometric control surfaces.

Clean finishes and touch up damage.

AGENCY TRAINING
All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Section 017900.

END OF SECTION 265629

DIVISION 27 – ELECTRICAL

SECTION 271000 – STRUCTURED CABLING

PART 1 - GENERAL

SCOPE

This section describes the products and execution requirements relating to furnishing and installation of Telecommunications Cabling and Termination Components and related sub-systems as part of a Structured Cabling System for the project.

Included are the following topics:

PART 1 - GENERAL
- SCOPE
- RELATED WORK
- REGULATORY AND STANDARDS REFERENCES
- DESIGN INTENT
- WORK SEQUENCE
- SUBMITTALS
- WORK BY STATE AND/OR USER AGENCY
- COOPERATION
- PROJECT RECORD DOCUMENTS
- QUALITY ASSURANCE
- DELIVERY, STORAGE AND HANDLING
- DRAWINGS

PART 2 - PRODUCTS
- BACKBONE COPPER DATA CABLING
- HORIZONTAL PERMANENT LINK
- COAXIAL CABLE (FOR WIDEBAND VIDEO)
- TELECOMMUNICATIONS OUTLET
- VOICE TERMINATION FIELD
- SURFACE RACEWAY

PART 3 - EXECUTION
- GENERAL
- CABLE INSTALLATION
- TELECOMMUNICATIONS OUTLET
- CABLE TERMINATION
- IDENTIFICATION AND LABELING
- TESTING AND ACCEPTANCE
- DOCUMENTATION
- AS-BUILT CONSTRUCTION DRAWINGS
- WARRANTY
- AS-BUILT COMMUNICATION CABLE COSTS
- CONSTRUCTION VERIFICATION ITEMS

RELATED WORK
Applicable provisions of Division 1 govern work under this Section.

Section 260500 – Common Work Results For Electrical
Section 260533 – Raceway and Boxes for Electrical Systems
Section 260526 – Grounding and Bonding for Electrical Systems
Section 260529 – Hangers and Supports for Electrical Systems
Section 260553 – Identification for Electrical Systems

REGULATORY AND STANDARDS REFERENCES
All work and materials shall conform in every detail to the rules and requirements of the National Fire Protection Association, the Wisconsin Electrical Code and present manufacturing standards.
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.

Other applicable standards are as follows:

- ANSI/IEEE C2 - National Electrical Safety Code
- NFPA 70- 2008 - National Electrical Code
- SPS Chapter 316 – Wisconsin Dept. of Safety and Professional Services Electrical Code
- TIA/EIA Standards 526-14A (OFSPT-14A), 526-7 (OFSPT-7), 568-B.1 (Category 5e), 568-B.2 (Category 6), 568-B.3, 569-B, 606A, and J-STD-607-B (with exceptions) including all applicable Addenda.
- ANSI/TIA-568C.0, -568-C.1, -568-C.2, -569B, -606A and ANSI-J-STD-607-B (with exception)
- IEEE/ANSI 142-1982 - Recommended Practice for Grounding of Industrial and Commercial Power Systems.
- ICEA publication S-80-576-2002
- TIA Fiber Optic Test Procedures (FOTPs) as noted.

DESIGN INTENT
General
The Structured Cabling System is based on a hierarchy of cables and termination locations.

All cables and related termination, support and grounding hardware, bonding, shall be furnished, installed, wired, tested, labeled, and documented by the Contractor, as detailed in the following sections.

Provide all labor and materials necessary to construct the system as described herein. This includes - but is not limited to - furnishing and installing cable, cable supports,

innerduct, racking and termination components, termination, testing, labeling, and documentation.

Horizontal Cabling
Horizontal Cabling System links the Telecommunications Outlet (TO) in the work area to the Horizontal Cross-connect serving that area (e.g. Telecommunications Room (TR) or Equipment Room (ER)). This "Permanent Link" includes 4-Pair Unshielded Twisted Pair (UTP) Copper Cables, terminated as specified in this document.
Separate Horizontal Cables designated for "DATA" and "VOICE" (Telephone) shall support each application.

Horizontal Cables for network-type Security devices (e.g. IP Video Surveillance Camera), if applicable, are considered "Data" cables for the proposes of this specification.

Performance of the Horizontal Permanent Link (cable + termination hardware) shall Meet TIA Category 5e.

Termination Hardware for Horizontal Cabling shall be rack-mounted Patch Panel.
Termination Hardware for Horizontal Cabling shall be as follows:

- Cabling designated for "Voice" - wall-mounted Block
- Cabling designated for "Data" – Rack-mounted Patch Panel

WORK SEQUENCE
During the construction period, coordinate telecommunications schedule and operations with the State of Wisconsin, Division of Facilities Development Construction Representative and Owner.

SUBMITTALS
Under the provisions of Section 260500 and Division 1, prior to the start of work, submit:

Certification documents confirming contractor status as active participant in Installers Program operated by Manufacturer of Cabling or Termination Components used.

Manufacturer's Data covering all products proposed indicating construction, materials, ratings, and all other parameters identified in Part 2 (Products) below.

Manufacturer's installation instructions.

Upon request by the Engineer, one 2-foot section of each cable type to be utilized for final approval by the Engineer. This2-foot section shall have the manufacturer's cable markings visible. Upon request, samples from every reel sent to the site shall be provided.

Prior to installation, provide samples of all label types planned for the Project. These samples shall include examples of the lettering to be used. Mount samples on 8 1/2" x 11" sheets and mark to indicate their proposed use.

Prior to system tests, submit Test Plan per Part 3.

Group Submittals to include complete documentation of related systems, products and accessories in a single submittal. Where applicable, mark dimensions in units to match those specified.

Submittals shall be original catalog sheets, photocopies, or electronic format (ADOBE Portable Document format ".pdf") thereof. Facsimile (fax) sheets shall not be accepted.

The Engineer shall review the Submittals and annotate them indicating approvals and shall return two sets of submittals to the contractor.

Work shall not proceed without the Engineer's approval of the submitted items.

If materials are furnished as specified no further qualifications are necessary. However, if the Contractor wishes to substitute another manufacturer and/or catalog number, the following information shall be submitted to the Engineer:

A complete description of the material which the contractor proposes to substitute (shop drawings, illustrations, catalog data, performance characteristics, etc.), and

The reason for the substitution identifying any benefit to the Owner.

The Engineer shall approve or decline all substitutions of material. No substituted materials shall be installed except by written approval from the Engineer.

WORK BY STATE AND/OR USER AGENCY
Equipment room racks and patch panels.

COOPERATION
Cooperate with other trades and State personnel in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the work to better fit the general installation, such work shall be done at no extra cost to the State, provided such decision is reached prior to actual installation. The Contractor shall check the location of electrical outlets with respect to Division 27 outlets and equipment before installing.

PROJECT RECORD DOCUMENTS
Submit record documents under the provisions of Specification Section 260500 and Part 3 of this section.

QUALITY ASSURANCE
The manufacturer(s) of cabling and connectivity components shall be a company specializing in and having a minimum of five years documented experience in producing products similar to those specified in this and related sections.

The contractor shall have been in this line of business for a minimum of 5 years and have successfully completed 4 projects equal in magnitude of the magnitude specified by these documents.

Contractor shall have necessary certifications to provide for Guarantees as specified herein.

Contractor shall be an active participant in Installers Program operated by Manufacturer of Cabling or Termination Components used. Contractor shall be participant in this program at time of Bidding and remain so throughout project.

Contractor shall have on the project team at a minimum one certified Installer trained by the manufacturer(s) of the cabling, hardware and accessories installed under this project.

At least one member of each test team shall be factory trained/certified in use of the test equipment. The project foreman shall have been factory trained in the use of the test equipment.

DELIVERY, STORAGE AND HANDLING
Store cable according to manufacturer's recommendations as minimum. In addition, store cable in a location protected from vandalism and weather. If cable is stored outside, it must be covered with opaque plastic or canvas with provision for ventilation to prevent condensation and for protection from weather. If air temperature at cable storage location will be below 4 degrees C., move cable to a heated (10 degrees C. minimum) location.

If the contractor wishes to have a trailer on site for storage of materials, arrangements shall be made with the Owner. If necessary, cable shall be stored off site at the contractor's expense.

DRAWINGS
It shall be understood that the electrical and communication details and drawings provided with the bid documents are diagrammatic. They are included to show intent and to aid the Contractor in bidding the job. The Contractor shall make allowance in their bid to cover whatever work is required to comply with the intent of the plans and specifications.

The Contractor shall verify all dimensions at the site and be responsible for their accuracy.

Prior to submitting the bid, the Contractor shall call the attention of the Engineer to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted, within ten (10) days prior to the Bid Due Date.

PART 2 - PRODUCTS

BACKBONE COPPER DATA CABLING

Not applicable to this project.

Horizontal Cable

Horizontal Cables shall be constructed of individually twisted pairs with 24-AWG insulated solid copper conductors.

All Cables and Termination hardware shall be technically compliant with and installed in accordance to the referenced TIA/EIA documents and perform as required to provide the Permanent Link margins stated herein.

All cables shall be suitable for installation in the environment defined.

Cables shall be Underwriters Laboratory (UL) listed, comply with Article 800 (Communications Circuits) of the National Electrical Code and shall meet the specifications of NEMA (low loss), UL 444, and ICEA.

Pairs of all 4-pair cables shall be unshielded and shall be identified by a banded color code in which conductor insulation is marked with a dominant color and banded with a contrasting color. By pair number, the pair colors or dominant band are:

Pair 1: Tip - White/Blue; Ring - Blue (or Blue/White)
Pair 2: Tip - White/Orange; Ring - Orange (or Orange/White)
Pair 3: Tip - White/Green; Ring - Green (or Green/White)
Pair 4: Tip - White/Brown; Ring - Brown (or Brown/White)

Cable Rating: CM (or approved substitutes as defined by the NEC).

Cable Jacket color shall be [Verify with Engineer].
Cable Jacket color(s) shall be as follows:

- Data Application - [Verify with Engineer]
- Voice Application - [Verify with Engineer]

Cable shall be packaged in a way that minimizes tangling and kinking of the cable during installation. Examples are open reels or packages that incorporate a rotating reel.

Cable performance shall be as required to meet the criteria defined in the Article “Horizontal Permanent Link” above.

Horizontal Cable Termination
Refer to Part 1 article “DESIGN INTENT” for termination hardware type(s).

Termination hardware performance shall be as required to meet the criteria defined in the Article “Horizontal Permanent Link” above.

Horizontal Fiber Optic Station Cable
Not applicable to this project.

COAXIAL CABLE (FOR WIDEBAND VIDEO)
Horizontal "TV" Coax
Cable shall be RG-59/U type; Quad-shield.

Cable shall be listed as being suitable for use in environment defined and shall meet a CM/CATV rating (or approved substitutes as defined by the NEC).

Outer jacket – As required for rating.

Impedance - 75 Ohms

TELECOMMUNICATIONS OUTLET
General
Station cables shall each be terminated at their designated workstation location in the connector types described in the sub-sections below. Included are Modular Jacks, and Coaxial Connector assemblies. These connector assemblies shall snap into a mounting frame. The combined assembly is referred to as the Telecommunications Outlet (TO).

All Telecommunications Outlets and the associated Jacks shall be of the same manufacturer throughout the project.

TO mounting configurations shall be as follows:

Flush where new or existing boxes are in place.

Mounted on Modular Furniture (base panel) - Modular Furniture Type shall be defined prior to construction.

The Telecommunications Outlet Frame shall accommodate:

A minimum of four Modular Jacks, and/or Coaxial Connectors when installed on a wall-mounted assembly.

A minimum of four Modular Jacks, and/or Coaxial Connectors when installed on a Floor-mounted assembly.

A minimum of two Modular Jacks when installed on modular furniture. Design shall accommodate bend radius of installed cables.

The outlet frame shall incorporate a mechanism for adjusting the surface plate to a plumb position.

Connectors shall be flush with the frame/faceplate.

The same orientation and positioning of Jacks and Connectors shall be utilized throughout the installation. Prior to installation, the Contractor shall submit the proposed configuration for each TO type for review by the Engineer.

Wall Mount Outlet Faceplates shall incorporate recessed designation strips at the top and bottom of the frame for identifying labels. Designation strips shall be fitted with clear plastic covers.

Unused jack positions shall be fitted with a removable blank inserted into the opening.

Faceplate of the TO shall be constructed of High Impact Plastic.

Outlet for Wall-mounted Telephone Sets
Outlets intended for wall-mounted telephone sets shall be installed where identified ("W") on the Project Drawing(s). The Wall Plate shall be of Stainless Steel construction, accommodate one modular jack as previously defined, mounted on a standard single gang outlet box or bracket and include mating lugs for wall phone mounting.

4-pair Copper Connector (Modular Jack)
Connector type for 4-pair UTP cabling shall be an 8-pin, 8-conductor (8P8C) Modular Jack.

The interface between the jack and the 4-pair cable shall be a 110-Style block or other insulation-displacement type contact. Termination components shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination

Modular Jacks shall be pinned per TIA standards as follows:

Data - T568B

Voice - [T568A][T568B]

Modular Jacks shall be UL verified and listed.

Modular Jack spring wire contacts shall have a minimum of 50 micro-inches of gold plating.

Modular Jack color(s) shall be as follows:

Data - [Verify with Engineer]

Voice - [Verify with Engineer]

Coax Connector
Terminate coax cable at the Workstation and at the Telecommunications Rooms in a Male "F" type connector.

The Male F-Connector shall:

Be matched to the cable type proposed by the Contractor.

Be a single piece connector.

Incorporate a compression sleeve.

Incorporate seals to inhibit moisture from entering the connector assembly.

When preparing the cable for termination, manufacturer installation procedures shall be adhered to. Special care shall be taken to ensure the proper center conductor length as specified by the manufacturer.

The Male F Connectors shall be mated to Female/Female Feed-thru Couplings at both the Outlet and Patch Panel locations. These couplings shall be matched to the Male F connector type. Couplings shall be of sufficient length as to allow for the Male F-Connector to fully seat (both sides).

It is the responsibility of the Contractor to ensure that their proposed design considers the available mounting depth in both the existing wall boxes and possible Surface Raceway. This may include the provision of Right Angle Cable Plugs, Feed through Couplings or other means.

VOICE TERMINATION FIELD
General
Blocks shall be 110-type.

The mechanical termination shall:

Have the ability of terminating 22 - 26 AWG plastic insulated, solid and stranded copper conductors.

Provide a direct connection between the cable and jumper wires.

Each row of blocks shall be provided with a label holder which is to be used to identify the cable pairs. Label shall be color coded to indicate cabling type.

Blocks shall identify pair position by a color designation - Blue, Orange, Green, Brown and Slate (Backbone only).

The blocks shall be designed to maintain the cable's pair twists as closely as possible to the point of mechanical termination.

Wall mounted patch panels and terminal blocks must be mounted on a prepared surface consisting of 5/8 inch plywood securely fastened to the building walls. All six surfaces of the plywood must be painted with fire retardant paint.

Where wall-mounted blocks are specified:

Provide Horizontal Troughs incorporating plastic or metal distribution rings shall be provided by the Contractor to accommodate routing of jumpers. Troughs shall be positioned at the top of each column of termination blocks and between each 100-pair wiring block.

Provide metal or plastic split distributing rings on both sides of the column of blocks to accommodate vertical routing of jumpers.

Where Horizontal and Backbone Cabling blocks are oriented vertically (rather than side-by-side), provide a backboard incorporating plastic distribution rings allowing for a change in direction in cross connect wiring between the blocks of each type.

SURFACE RACEWAY

Where indicated on project drawings, Surface Raceway will be used as a cable path to individual Telecommunications Outlet locations. No exposed wire shall be permitted.

Refer also to Section 260533 “Raceway and Boxes for Electrical Systems” for metallic and/or non-metallic Raceway guidelines for this Project.

With the agreement of the Architect/Engineer, if a need arises to add telecommunications outlets in areas where the walls cannot be fished, the station wire serving these outlets shall be covered with raceways. No exposed wire shall be permitted within offices, laboratories, corridors, conference rooms or like facilities.

The non-metallic surface raceway shall have a screw applied base and have a snap on cover. Both the base and cover shall be manufactured of rigid natural PVC compounds.

The color of this raceway shall be [electrical ivory][match the décor] and be paintable. All fittings including, but not limited to, extension boxes, elbows, tees, fixture boxes shall match the color of the raceway.

The raceway and all system devices must be UL Listed, exhibit nonflammable self-extinguishing characteristics, tested to specifications of UL94V-0 and be Category Compliant as defined by TIA-569-B.

Minimum bend radius shall be adhered to for UTP and fiber optic cable.

PART 3 - EXECUTION

GENERAL

Refer to Project Drawings which indicate Telecommunications Outlet locations, major cable routes and termination location(s) within each building. Coordinate duct allocation with the Agency.

Furnish and install all cables, connectors, hardware and equipment as shown on drawings and as specified above.

It is the contractor's responsibility to survey the site and include all necessary costs to perform the installation as specified.

The contractor will be responsible for identifying and reporting to the WisDOT Construction Representative any existing damage to walls, flooring, tiles and furnishings in the work area prior to start of work. All damage to interior spaces caused by the installation of cable, raceway or other hardware must be repaired by the Contractor. Repairs must match preexisting color and finish of walls, floors and ceilings. Any contractor-damaged ceiling tiles are to be replaced by the contractor to match color, size, style and texture.

Where unacceptable conditions are found, the Contractor shall bring this to the attention of the WisDOT Construction Representative immediately. A written resolution will follow to determine the appropriate action to be taken.

Beginning installation means contractor accepts existing conditions.

Should it be found by the Engineer that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and drawings with the respect or regard to the quality, value of materials, appliances or labor used in the work, it shall be rejected and replaced by the Contractor and all work disturbed by changes necessitated in consequence of said defects or imperfections shall be made good at the Contractor's expense.

All cables, termination components and support hardware shall be furnished, installed, tested and documented by the Contractor unless noted otherwise.

CABLE INSTALLATION

General

Install all cables in continuous lengths from endpoint to endpoint. No splices shall be allowed unless noted otherwise.

Furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment is to include, but not limited to, sheaves, winches, cable reels, cable reel jacks, duct entrance tunnels, pulling tension gauge and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices, which may move or wear in a manner to pose a hazard to the cable, shall not be used.

Pull all cable by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to ensure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a “break-away” or other approved method.

Complete all work using qualified personnel utilizing state-of-the-art equipment and techniques. During pulling operation an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit, as well as to feed cable and operate pulling machinery.

Pull cable in accordance to cable manufacturer’s recommendations and ANSI/IEEE C2 standards. Manufacturer’s recommendations shall be a part of the cable submittal. Recommended pulling tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed. If any installed cable is kinked to a radius less than recommended dimension it shall be replaced by the contractor with no additional cost to the project.

All wiring shall be run “free-air”, in conduit, in a secured metal raceway or in modular furniture as designated on the plan drawings. All cable shall be free of tension at both ends.

Avoid abrasion and other damage to cables during installation.

Pulling Lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used. Lubricant shall not harden or become adhesive with age.

All cable shall be free of tension at both ends. In cases where the cable must bear some stress, Kellom grips may be used to spread the strain over a longer length of cable.

Manufacturer’s minimum bend radius specifications shall be observed in all instances.

A pull cord (nylon; 1/8” minimum) shall be co-installed with all cable installed in any conduit.

Protection of cable from foreign materials:
Provide adequate physical protection during construction to prevent foreign material application or contact with any cable type.

Foreign material is defined as any material that would negatively impact the validity of the manufacturer’s performance warranty. This includes, but is not limited, to overspray of paint (accidental or otherwise), drywall compound, or any other surface chemical, liquid or compound that could come in contact with the cable, cable jacket or cable termination components.

Overspray of paint on any cable, cable jacket or cable termination component will not be accepted.

It shall be the Contractor’s responsibility to replace any component in its entirety affected by a foreign material. This shall be at no additional cost to the project. Cleaning of the cables with chemicals is not allowed. This requirement is regardless of the PASS/FAIL test results of the affected cable.

Should the manufacturer and/or warrantor of the structured cabling system desire to physically inspect the installed condition and certify the validity of the structured cabling system (via a signed and dated statement by an authorized representative of the structured cabling manufacturer), the Owner may, at their sole discretion, agree to accept said warranty in lieu of having the affected cables replaced.

In the case of plenum cabling, in addition to the statement from the manufacturer, the Contractor shall also present to the Owner a letter from the local Authority Having Jurisdiction stating that they consider the plenum rating of the cable to be intact and acceptable.

Horizontal (Station) Cable Installation
Locate Telecommunications Outlets as identified on the Project Drawings.

Route Horizontal Cabling on each Floor to the Telecommunications Room (TR) on that floor or to the designated TR if on another floor.

The maximum station cable drop length for Data and Voice UTP (Category 5e or Category 6) shall not exceed 295-feet (90-meters) in order to meet data communications performance specifications. This length is measured from the termination panel in the wiring closet to the outlet and must include any slack required for the installation and termination.

The Contractor is responsible for installing station cabling in a fashion as to avoid unnecessarily long runs. Any area that cannot be reached within the above constraints should be identified and reported to the Engineer prior to installation.

Changes to the plan shall be approved by the Engineer.

There is no restriction on the length of Category 3 voice cabling within a building (if applicable).

Where installed free-air, installation shall consider the following:

Cable shall run at right angles and be kept clear of other trades work.

Support cables according to code utilizing "J-Hook" or "Bridal Ring" supports anchored to ceiling concrete, or structural steel beams. Cable support devices shall be designed to maintain cables bend to larger than the minimum bend radius.

J-Hooks shall incorporate a metal wire or other type closure to retain the cables.

Bridal Rings shall be equipped with “saddles” to maintain the required bend radius.

Space supports at a maximum 4-foot interval unless limited by building construction. If cable "sag" at mid-span exceeds 6-inches, another support shall be used.

Do not place cable directly on the ceiling grid or attach cable in any manner to the ceiling grid wires.

Do not attach cables to existing cabling, plumbing or steam piping, ductwork, ceiling supports or electrical or communications conduit.

Care should be taken in the use of cable ties to secure and anchor the station cabling. Ties should not be over tightened as to compress the cable jacket. No sharp burrs should remain where excess length of the cable tie has been cut.

Protect cable sheaths from damage from sharp edges. Where a cable passes over a sharp edge, provide a bushing or grommet to protect the cable.

Place a coil of 4 feet in each cable shall in the ceiling at the last support (e.g. J-Hook, Bridal Ring, etc.) before the cables enter a fishable wall, conduit, surface raceway or box. At any location where cables are installed into movable partition walls or modular furniture via a service pole, approximately 15-feet of slack shall be left in each station cable under 250-feet in length to allow for change in the office layout without re-cabling. These "service loops" shall be secured at the last cable support before the cable leaves the ceiling and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.

At all Telecommunication Rooms (TR), provide approximately 10-feet of slack in each station cable under 250-feet in length to allow for changes in the telecommunication room layout without re-cabling. These "service loops" shall be secured to the ladder rack, with “J” hooks, or “D” rings above the equipment, racks, and patch panels and shall be coiled from 100% to 200% of the cable recommended minimum bend radius.

Minimum separation distances between communications wires and cables, and any electric light, power, Class 1, non-powered fire alarm, or medium power network-powered broadband communications circuit shall comply with NEC Article 800.

In addition, to reduce or eliminate EMI, the following minimum separation distances shall be adhered to:

12 inches from power lines □ 5 kVA.

39 inches from power lines ≥ 5 kVA.

39 inches from transformers and motors.

18 inches from high voltage lighting (including fluorescent).

All openings shall be sleeved and firestopped per prevailing code and building construction ratings upon completion of cable installation.

Within the equipment room in which Data Cabling is to be terminated, use only Hook and Loop(e.g. “Velcro”) ties from room entry to the point of termination. This is to facilitate the addition of future cables.

Station Cabling in Modular Furniture
Protect cabling routed from an in-wall box, poke-through fitting or other device to modular furniture without wall contact via a length of flexible plastic conduit, “spiral wrap” or other approved protective means. Conduit fittings shall be compatible with the "Poke-thru" and Wall Fittings proposed. There shall be no exposed cable in the transition to the modular furniture. Fill Ratio (Cable Area vs. Conduit Area) in each feed shall not exceed 40%.

Where horizontal cabling is routed to a floor fitting via the floor below, the cabling shall return to the floor on which the Telecommunications Outlet appears and be terminated in the Telecommunications Room serving other Telecommunications Outlets in that area.

For purposes of bidding, it is to be assumed that the cable pathway shall be limited to the bottom panel of the modular furniture only. Communications cables would be run through these channels to the jack location.

For purposes of bidding, it is to be assumed that it will be the responsibility of the Contractor to punch and re-install the bottom molding panels on the modular furniture as required to accommodate the Communications cabling and Telecommunications Outlets. The panels shall be marked prior to installation by the owner to identify the desired location of the Telecommunications Outlets. Any discrepancy between the Project Drawing identifying Outlet locations and the markings should be brought to the attention of the WisDOT Construction Representative.

The TO shall be secured to the panel via mounting tabs, pop-rivets, screws or other approved method. Use of adhesive tape is not acceptable. The method of securing the TO to the panel shall not result in sharp protrusions (e.g. sheet metal screw tip) into the channel behind the panel.

Grounding
Where a cable incorporates metal armor, strength elements or other metallic elements (not including conductors), Bond those elements to an approved ground using a #6 AWG solid copper conductor. Cable grounding hardware and method shall be per manufacturer's recommendations.

TELECOMMUNICATIONS OUTLET
General
Information Outlets shall be flush mounted on wall-mounted boxes, in floor-mounted boxes, on Surface Raceway and in modular furniture.

Mount outlets level.

Position any outlets to be added where these conditions are not met at a height matching that of existing services or as directed otherwise by the Site Coordinator and the Engineer. Refer to project drawings for nominal height. Where not shown, default mounting height (from finished floor to center line of outlet) in new installation shall be as follows:

Standard Voice & Data Outlet	18-inches
Outlet for Wall-Mounted Telephone	6-inches.

CABLE TERMINATION
General
At the Telecommunications Rooms, position all Data and Voice Cables on termination hardware in sequence of the Outlet I.D. starting with the lowest number. Exceptions to the sequencing of terminations are allowed only with the permission of the WisDOT project manager and A/E.

Termination Hardware (Blocks and Patch Panels) Positioning and Layout must be reviewed and approved by the Engineer prior to construction. The review does not exempt the Contractor from meeting any of the requirements stated in this document.

Cable Termination –Blocks

General

Refer to the Project Drawings and Part 2 of this section which indicates mounting requirements for Termination Blocks.

Coordinate the placement of blocks with other cabling where applicable.

Unless spare capacity is noted on project drawings:

Provide Horizontal Blocks to accommodate minimum of 20% growth in the quantity of stations relative to the initial installation, adjusted upward to the nearest commercially available block size.

Provide Intra-building Backbone Blocks to accommodate minimum 20% growth, adjusted upward to the nearest commercially available block size. Assume (1) that all four pairs in horizontal cabling designated as for "Voice" are cross connected to the backbone cabling.

Size Inter-building Backbone Voice cabling to include 30% growth relative to initial requirements, adjusted upward to the nearest commercially available block size.

Provide cable management hardware (e.g. D Rings and cable guides) to neatly and securely route the cable from cable tray to the cable termination hardware.

The Height of the Voice Termination Field shall not exceed 6-feet (72-inches) above floor level to facilitate cable maintenance.

Position Blocks on which Backbone and Station Cabling are terminated in separate columns. Position Backbone Cabling to the Left; Station cabling to the Right. Position Blocks close proximity to simplify installation and subsequent tracing of cross-connect wiring. Where new cabling is to be integrated with existing cabling at the building entrance, it will be the responsibility of the Contractor, in cooperation with the Owner, to coordinate placement of Voice Termination hardware with the Local Exchange Carrier(s) serving the site.

Route cables to wall-mounted blocks from below the blocks in a manner that will facilitate growth.

Cable Management

Provide Horizontal Troughs incorporating split plastic distribution rings to accommodate routing of jumpers. Troughs shall be positioned at the top of each column of termination blocks and between each 100-pair wiring block.

Position Rings between the Backbone and Station blocks for vertical routing of jumpers and/or cross-connect wiring.

Termination
For termination of Horizontal Cabling, use four-pair (e.g. C4-type) clips. The twenty-fifth pair of each row on the 110 type block located at the Horizontal Cross-connect (e.g. Telecom Room / IDF) shall not be used for termination of horizontal voice cable.

For termination of Backbone Cabling, use five-pair (e.g. C5-type) clips.

Ensure that the twists in each cable pair are preserved to within 1.0-inch of the termination for all Voice UTP backbone cables and within 0.5-inch for Category 5e and Category 6 cables. Remove cable jacket only to the extent required to make the termination.

Cross Connect Wiring
The Owner shall be responsible for the "Cross-connect" wiring between Horizontal and Backbone cabling.

Cross-connect 4 pairs in each Horizontal cable shall be cross-connected to the Backbone cable. 4-pair Cross-connect wire, color coded to identify each pair, shall be used. The 25TH pair position (50TH, 75TH, etc.) of each riser voice block shall remain vacant.

Do not fasten cables directly to support brackets with wire or plastic ties. Neatly lace, dress and support all cabling. Provide Retainer Clips on each 110-type block to secure jumper wires on the wiring block(s).

The contractor shall not be responsible for cross-connects between the cabling terminations at the Main Cross-connect (e.g. Entrance Room, Main Equipment Room, MDF) and Inter-building Backbone or Service Provider cabling. It shall be the responsibility of the Contractor, to work with the Owner and WisDOT Construction Representative and provide the necessary assistance to allow Owner and/or Telephone Company personnel to make the necessary connections to establish service on the new cable system. These activities include, but are not limited to cross connect documentation, general wiring overview and cable pair identification.

Voice Multiplier Blocks
At the Main Cross-connect location (MDF), provide (1) Voice "Multiplier Block" to accommodate the potential for multiple extensions of a single line.

Multiplier Block shall be formed by running short sections of Cross-connect wire vertically through each index strip on a 100 pair block (4 rows). Five pair connecting clips shall be used.

Block application and the common connections shall be clearly marked on the designation strips.

Cable Termination - Data UTP

Install Data Patch Panel(s) in a fashion as to allow future station cabling to be terminated on the panel without disruption to existing connections.

Size Data Patch panels to accommodate a minimum of 20% growth in the quantity of stations relative to the initial installation.

At Information Outlets and Data Patch Panels, ensure that the twists in each cable pair are preserved to within 0.5-inch of the termination for Data cables. The cable jacket shall be removed only to the extent required to make the termination.

Cable Termination - Coax
Prepare cable for termination per manufacturer's installation procedures. Special care shall be taken to ensure the proper center conductor length as specified by the manufacturer.

Terminate all cables in the specified connector type.

IDENTIFICATION AND LABELING
Refer to Section 260553 "Identification for Electrical Systems" for Identification and Labeling guidelines for this Project.

Label all Backbone and Horizontal Cable, Outlet Faceplates, and Termination components (e.g. Voice Termination Blocks & Modular Patch Panel).

Prior to installation, provide samples of all label types planned for the project. These samples shall include examples of the lettering to be used.

TESTING AND ACCEPTANCE
General
Prior to testing, 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 approved by the Engineer. Failure to provide the above information shall be grounds for the Owner/Engineer to reject any and all Documentation of Results on related testing and to require a repeat of the affected test.

Visually inspect all cabling and termination points to ensure that they are complete and conform to the wiring pattern defined herein. Provide to the Engineer with a written certification that this inspection has been made.

Conduct acceptance testing according to a schedule coordinated with the Agency and WisDOT.

Representatives of the Owner may be in attendance to witness the test procedures. Provide a minimum of one (1) week advance notice to allow for such participation.

Supply all equipment and personnel necessary to conduct the acceptance tests.

All equipment used in testing shall be maintained and calibrated per manufacturer's guidelines. Provide documentation of equipment calibration.

Document all tests. Refer to the Article "DOCUMENTATION" below which details requirements.

Perform tests related to connected equipment of others only with the permission and presence of Contractor involved.

All cabling shall be 100% fault free unless noted otherwise. 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 the contractor. The applicable tests shall then be repeated.

Should it be found by the Engineer that the materials or any portion thereof furnished and installed under this contract fail to comply with the specifications and drawings, with the 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 the Contractor and all work distributed by changes necessitated in consequence of said defects or imperfections shall be made good at the Contractor's expense.

Copper Backbone Cabling
Backbone Voice cables shall be free of shorts within the pairs, and be verified for continuity, pair validity and polarity and conductor position on the termination blocks.

Any mis-positioned pairs shall be corrected.

The percentage of "bad" pairs shall not exceed 3% in any Backbone Cable based on total pair count. All bad pairs must be identified and documented.

Horizontal 4-pair Copper Cabling
General
Testing shall be from the Telecommunications Outlet to the Data Patch Panel (or Wiring Block) at the TR on which the cables are terminated.

The cabling must pass all the specified requirements including margins. Conditional passing test results passes that are within the measurements accuracy of the test equipment (.e.g. "*PASS") are not acceptable.

When the TO is located on/in the wall behind modular furniture, a patch cord may be inserted into the TO to allow the furniture to be returned to its normal location. Cable testing, in this case, will be done with the patch cord. If the cable test fails only due to the length of the patch cord, the WisDOT will accept the cable as passing.

Horizontal “Station” cables shall be free of shorts within the pairs, and be verified for continuity, pair validity and polarity, and Wire Map (Conductor Position on the Modular Jack).

Any defective, split or mis-positioned pairs shall be corrected.

Additional testing of Cabling Systems rated at TIA Category 5e and higher shall be performed to confirm proper functioning and performance.

Performance Testing
Testing of the Transmission Performance of station cables shall include the following:

Length
Attenuation
Pair to Pair NEXT Loss
PSNEXT Loss
Pair to Pair ELFEXT Loss (Equal Level Far End Cross-talk)
PSEFEXT Loss
Propagation Delay
Delay Skew
Return Loss

Cables shall be tested to the maximum frequency defined by the standards covering that 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. Test method shall document all parameters specified by the standard including margins over minimal compliance.

Performance testing shall be per ANSI/TIA-568-C.2 Permanent Link test configuration and procedures

Where margin(s) over compliance with the identified standard(s) is specified, the contractor shall field verify that the necessary margins are met and take corrective actions necessary to remedy out-of-spec links.

The maximum length of station cable shall not exceed 90 meters, which allows 10 meters for equipment and patch cables.

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 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.

In the event results of the tests are not satisfactory, the Contractor shall make changes as necessary, and shall then repeat the test or tests which disclosed faulty or defective material, equipment or installation method, and shall make additional tests as the Engineer deems necessary at no additional expense to the project or user agency.

Special Considerations
Where Cabling is Terminated in a Modular Plug at the device location (e.g. Video Surveillance Camera or Wireless Access Point), use one of the following methods:

Use Modular-Jack to Modular Jack adapter cord.
or
Use tester configured with Channel Test head at "plug end". This method muse be supported by the test equipment manufacturer.

Voice Channel Test
Where cross-connection of cabling sub-systems (e.g. Station & Backbone) by the Contractor is specified, test each subsystem separately as defined. Test Voice Channel after the cross-connect wiring/patching is complete.

Voice Channel Test confirms the end-to-end voice transmission between the Main Cross-connect and the Telecommunications Outlet (Voice) and include patch cords/jumper cables.

All pairs shall be tested and are to be free of shorts, verified for continuity, pair validity, polarity, and conductor position.

Correct any mis-positioned pairs or cross-connect wiring. Replace any patch cords/jumper cables which cause the Voice Channel test to fail and retest Channel.

Performance testing on the Voice Channel is not required.

Coaxial Cable Testing
Test coaxial cables to:

Locate Breaks, Faults or flawed terminations.

Verify Length.

Verify Impedance (to within 5% of nominal value).

Verify Return Loss (5-MHz to 1-GHz).

Terminate cable - as required by individual tests - with its characteristic impedance.

Backbone Copper Data Cabling
Not applicable to this project.

DOCUMENTATION

General

Upon completion of the installation, provide project documentation to the Engineer for review. Documentation shall include the items detailed in the sub-sections below. Provide approved test results and documentation in Operations and Maintenance Manuals.

Submit documentation of Test Results in electronic form for review and distribution. Where documentation provided in electronic form requires unique software (other than Adobe Acrobat Reader) for viewing test results, provide one (1) copy of such software. The software shall run on a MICROSOFT Windows-based personal computer supplied by the Owner. Software shall include license if applicable. Provide final documentation on CD-ROM. Interim documentation may be submitted to the Engineer for review via email, FTP, CD-ROM or other electronic means.

Name file(s) and records shall use building, route or other cable identifiers that match labeling formats used. Prefix file name with the WisDOT project number.

Provide test results and describe the conduct of the tests including the date of the tests, the equipment used and the procedures followed. At the request of the Engineer, provide copies of the original test results.

Submit Documentation within 10 working days of the completion of each testing phase (e.g. subsystem, cable type, area, floor, etc.).

This is inclusive of all test result and draft as-built drawings. Draft drawings may include annotations done by hand.

Machine generated (final) copies of all drawings shall be submitted within 30 working days of the completion of each testing phase.

The Engineer may request that a 10% random field re-test be conducted on the cable system at no additional cost to verify documented findings. Tests shall be a repeat of those defined above. If findings contradict the documentation submitted by the Contractor, additional testing can be requested to the extent determined necessary by the Engineer, including a 100% re-test. This re-test shall be at no additional cost to the Owner.

Test Data - Copper Media

Test results shall include a record of test frequencies, cable type, conductor pair and cable (or Outlet) I.D., measurement direction, test equipment type, model and serial number, date, reference setup, and crew member name(s).

Submit Test Results for each Horizontal Link in electronic form a) in the native format of the test instrument (e.g. .flw for Fluke, .sdf for Agilent or Ideal, etc.) and b) summarized in a fashion that includes a graphical display of all test parameters.

The summary shall document the worst-case margin over minimal TIA "Category" compliance for the cables tested. The summary shall be in Adobe Acrobat .pdf format.

Submit Test Results for each Backbone Copper Cable in electronic form a) in the native format of the test instrument and b) summarized in a fashion that includes a graphical display of all test parameters. The summary shall be in Adobe Acrobat .pdf format.

AS-BUILT CONSTRUCTION DRAWINGS
Provide Record Drawings which denote as-built information.

Include cable routes and outlet locations.

Identify Telecommunications and other low-voltage Outlet locations by their sequential number as defined elsewhere in these documents. Numbering, icons and drawing conventions used shall be consistent throughout all documentation provided.

The Division of Facilities Development - through the Consultant - will provide floor plans in paper and electronic (AutoCAD .dwg) formats on which as-built construction information can be added. These documents will be modified accordingly by the contractor to denote as-built information as defined above and returned to the Consultant for acceptance. This information shall be supplied to the Consultant/Engineer no later than 4 weeks prior to the scheduled occupancy of the affected floors.

Annotate the base drawings and return to the A/E in hard copy (same plot size as originals) and electronic (AutoCAD .dwg) form.

Identify each drawing submitted by the Contractor as part of the Project Documentation as an "As-built" drawing and include a) the contractor name and/or logo, and b) the date of the drawing.

Retain all fonts, color, layer, Model Space/Paper Space conventions established in the base drawings by the Contractor in preparation of the As-built drawings.

Prior to generation of the drawings, provide a sample file and test plot to the Engineer for review and approval.

All documentation, including hard copy and electronic forms shall become the property of the State.

WARRANTY
See Division 1, Section 010000 General Requirements for general requirements.

Minimum Warranty period for Structured Cable System sub-systems shall be as follows:

Horizontal Copper Permanent Link – 15 years. Warranty shall be direct from manufacturer(s) of cabling and connecting components to Owner.

Copper Backbone – 2 years. Cabling and Connecting Components shall carry a 15 year component warranty.

Fiber Optic Backbone – 2 years. Cabling and Connecting Components shall carry a 15 year component warranty.

Warranty shall include all labor, material, and travel time.

Provide Warranty certification by the of the Horizontal Copper Permanent Link by the manufacturer(s) of cabling and connecting components as part of system documentation.

END OF SECTION 271000

SECTION 275116 – PUBLIC ADDRESS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preamplifiers.
2. Power amplifiers.
3. Microphones.
4. Control console.
5. Loudspeakers.
6. Microphone outlets.
7. Conductors and cables.
8. Raceways.

1.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports and seismic restraints for control consoles and components, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Delegated-Design Submittal: For supports and seismic restraints for control consoles and components indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Detail fabrication and assembly of supports and seismic restraints for control consoles and components.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alpha Communications.
2. Altec Lansing Technologies, Inc.
3. Atlas Sound LP.
4. Bogen Communications, Inc.
5. Dukane Communication Systems; part of GE Infrastructure, Security.
6. Edwards Signaling & Security Systems; part of GE Infrastructure, Security.
7. Electro-Voice; Telex Communications, Inc.
8. Federal Signal Corporation; Electrical Products Division.
9. Peavey Electronics.
10. Rauland-Borg Corporation.
11. Whelen Engineering Company, Inc.

2.2 FUNCTIONAL DESCRIPTION OF SYSTEM

A. System Functions:

1. Selectively connect any zone to any available signal channel.

2. Selectively control sound from microphone outlets and other inputs.

3. "All-call" feature shall connect the all-call sound signal simultaneously to all zones regardless of zone or channel switch settings.

4. Reproduce high-quality sound that is free of noise and distortion at all loudspeakers at all times during equipment operation including standby mode with inputs off; output free of nonuniform coverage of amplified sound.

2.3 GENERAL EQUIPMENT AND MATERIAL REQUIREMENTS

A. Compatibility of Components: Coordinate component features to form an integrated system. Match components and interconnections for optimum performance of specified functions.

B. Equipment: Comply with UL 813. Equipment shall be modular, using solid-state components, and fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.

C. Weather-Resistant Equipment: Listed and labeled by a qualified testing agency for duty outdoors or in damp locations.

2.4 PREAMPLIFIERS

A. Preamplifier: Integral to power amplifier.

B. Output Power: Plus 4 dB above 1 mW at matched power-amplifier load.

C. Total Harmonic Distortion: Less than 1 percent.

D. Frequency Response: Within plus or minus 2 dB from 20 to 20,000 Hz.

E. Input Jacks: Minimum of two. One matched for low-impedance microphone; the other matchable to cassette deck, CD player, or radio tuner signals without external adapters.

F. Minimum Noise Level: Minus 55 dB below rated output.

G. Controls: On-off, input levels, and master gain.

2.5 POWER AMPLIFIERS

A. Mounting: Console.

B. Output Power: 70-V balanced line. 80 percent of the sum of wattage settings of connected for each station and speaker connected in all-call mode of operation, plus an allowance for future stations.

C. Total Harmonic Distortion: Less than 3 percent at rated power output from 50 to 12,000 Hz.

D. Minimum Signal-to-Noise Ratio: 60 dB, at rated output.

E. Frequency Response: Within plus or minus 2 dB from 50 to 12,000 Hz.

F. Output Regulation: Less than 2 dB from full to no load.

G. Controls: On-off, input levels, and low-cut filter.

H. Input Sensitivity: Matched to preamplifier and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on speaker microphone or handset transmitter.

2.6 MICROPHONES

A. Paging Microphone:

1. Type: Dynamic, with cardioid polar characteristic.

2. Impedance: 150 ohms.

3. Frequency Response: Uniform, 50 to 14,000 Hz.

4. Output Level: Minus 58 dB, minimum.

5. Finish: Satin chrome.

6. Cable: C25J.

7. Mounting: Desk stand with integral-locking, press-to-talk switch.

2.7 CONTROL CONSOLE

A. Cabinet: Modular, counter top; complying with TIA/EIA-310-D.

B. Housing: Steel, 0.0478 inch (1.2 mm) minimum, with removable front and rear panels. Side panels are removable for interconnecting side-by-side mounting.

C. Controls:

1. Switching devices to select signal sources for distribution channels.

2. Program selector switch to select source for each program channel.

3. Switching devices to select zones for paging.

4. All-call selector switch.

D. Indicators: A visual annunciation for each distribution channel to indicate source being used.

E. Self-Contained Power and Control Unit: A single assembly of basic control, electronics, and power supply necessary to accomplish specified functions.

F. Spare Positions: 20 percent spare zone control and annunciation positions on console.

G. Microphone jack.

2.8 LOUDSPEAKERS

A. Cone-Type Loudspeakers:

1. Minimum Axial Sensitivity: 91 dB at one meter, with 1-W input.

2. Frequency Response: Within plus or minus 3 dB from 50 to 15,000 Hz.

3. Size: 8 inches (200 mm) with 1-inch (25-mm) voice coil and minimum 5-oz. (140-g) ceramic magnet.

4. Minimum Dispersion Angle: 100 degrees.

5. Rated Output Level: 10 W.

6. Matching Transformer: Full-power rated with four taps. Maximum insertion loss of 0.5 dB.

7. Surface-Mounting Units: Ceiling, wall, or pendant mounting, as indicated, in steel back boxes, acoustically dampened. Front face of at least 0.0478-inch (1.2-mm) steel and whole assembly rust proofed and shop primed for field painting.

8. Flush-Ceiling-Mounting Units: In steel back boxes, acoustically dampened. Metal ceiling grille with white baked enamel.

2.9 OUTLETS

A. Microphone Outlet: Three-pole, polarized, locking-type, microphone receptacles in single-gang boxes. Equip wall outlets with brushed stainless-steel device plates. Equip floor outlets with gray tapered rubber or plastic cable nozzles and fixed outlet covers.

2.10 CONDUCTORS AND CABLES

A. Jacketed, twisted pair and twisted multipair, untinned solid copper.

1. Insulation for Wire in Conduit: Thermoplastic, not less than 1/32 inch (0.8 mm) thick.

2. Microphone Cables: Neoprene jacketed, not less than 2/64 inch (0.8 mm) thick, over shield with filled interstices. Shield No. 34 AWG, tinned, soft-copper strands formed into a braid or approved equivalent foil. Shielding coverage on conductors is not less than 60 percent.

3. Plenum Cable: Listed and labeled for plenum installation.

2.11 RACEWAYS

A. Conduit and Boxes: Outlet boxes shall be not less than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

PART 3 - EXECUTION

3.1 WIRING METHODS

A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in "Raceway and Boxes for Electrical Systems."

B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF RACEWAYS

A. Comply with requirements in "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.

B. Install manufactured conduit sweeps and long-radius elbows whenever possible.

3.3 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Cable Installation Requirements:

1. Terminate conductors; no cable shall contain un-terminated elements. Make terminations only at outlets and terminals.

2. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.

3. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.

4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

5. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.

6. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.

2. Suspend speaker cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceiling by cable supports not more than 60 inches (1524 mm) apart.

3. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.

D. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches (300 mm) apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.

3.4 INSTALLATION

A. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.

B. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.

C. Wall-Mounted Outlets: Flush mounted.

D. Floor-Mounted Outlets: Conceal in floor and install cable nozzles through outlet covers. Secure outlet covers in place. Trim with carpet in carpeted areas.

E. Conductor Sizing: Unless otherwise indicated, size speaker circuit conductors from racks to loudspeaker outlets not smaller than No. 18 AWG and conductors from microphone receptacles to amplifiers not smaller than No. 22 AWG.

F. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.

G. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.

H. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Schedule tests with at least seven days' advance notice of test performance.

2. After installing public address and mass notification systems and after electrical circuitry has been energized, test for compliance with requirements.

3. Operational Test: Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.

4. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.

5. Power Output Test: Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.

C. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.

D. Public address and mass notification systems will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

1. Include a record of final speaker-line matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

END OF SECTION 275116

DIVISION 28 – ELECTRICAL SAFETY AND SECURITY

SECTION 280500 – COMMON WORK RESULTS FOR ELECTRONIC SAFETY & SECURITY

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract shall govern all work under this Section.

PART 1 - GENERAL
- Scope
- Reference Standards
- Regulatory Requirements
- Quality Assurance
- Continuity of Existing Services and Systems
- Protection of Finished Surfaces
- Approved Electrical Testing Laboratories
- Sleeves and Openings
- Sealing and Firestopping
- Work By State
- Provisions for Future Work
- Intent
- Omissions
- Submittals
- Project/Site Conditions
- Work Sequence and Scheduling
- Work by Other Trades
- Offsite Storage
- Request and Certificate for Payment
- Salvage Materials
- Certificates and Inspections
- Operating and Maintenance Instructions
- Training of Agency Personnel
- Record Drawings

PART 2 - PRODUCTS
- Access Panels and Doors
- Identification
- Sealing and Firestopping

PART 3 - EXECUTION

Excavation and Backfill
Concrete Work
Cutting and Patching
Building Access
Equipment Access
Working Clearances
Coordination
Sleeves
Sealing and Firestopping
Housekeeping and Clean Up

SCOPE

Common Work Results are applicable to all Division 28 sections. This section includes information common to two or more technical specification sections or items that are of a general nature, not conveniently fitting into other technical sections.

REFERENCE STANDARDS

Abbreviations of standards organizations referenced in this and other sections are as follows:

NEC National Electric Code
NEMA National Electrical Manufacturers Association
NESC National Electrical Safety Code
NFPA National Fire Protection Association
UL Underwriters Laboratories Inc.

REGULATORY REQUIREMENTS

All work and materials are to conform in every detail to applicable rules and requirements of the Wisconsin State Electrical Code Volumes 1 and 2, the National Electrical Code (ANSI/NFPA 70), other applicable National Fire Protection Association codes, the National Electrical Safety Code, and present manufacturing standards (including NEMA). All Division 26 work shall be done under the direction of a currently certified State of Wisconsin Certified Master Electrician.

QUALITY ASSURANCE

Where equipment or accessories are used which differ in arrangement, configuration, dimensions, ratings, or engineering parameters from those indicated on the contract documents, the contractor is responsible for all costs involved in integrating the equipment or accessories into the system and the assigned space and for obtaining the performance from the system into which these items are placed.

All materials shall be listed by and shall bear the label of an approved electrical testing laboratory. If none of the approved electrical testing laboratories has published standards for a particular item, then other national independent testing standards, subject to approval of the DOT, shall apply and such items shall bear those labels. Where one of the approved electrical testing laboratories has an applicable system listing and label, the entire system shall be so labeled.

CONTINUITY OF EXISTING SERVICES AND SYSTEMS
No outages shall be permitted on existing systems except at times and during intervals specified by the tenant or DOT Project Representative. The agency may require written approval. Any outage must be scheduled when the interruption causes the least interference with normal tenant schedules and business routines. No extra costs will be paid to the Contractor for such outages, which must occur outside of regular weekly working hours.

Any circuit interrupted as a result of this work shall be restored to proper operation by this Contractor as soon as possible.

PROTECTION OF FINISHED SURFACES
See Division 1 for additional requirements.

Furnish one can of touch-up paint for each different color factory finish which is to be the final finished surface of each product furnished by the Contractor. Deliver touch-up paint with other "loose and detachable parts" as covered Division 1.

APPROVED ELECTRICAL TESTING LABORATORIES
The following laboratories are approved for providing electrical product safety testing and listing services as required in these specifications:

Underwriters Laboratories Inc.
Electrical Testing Laboratories, Inc.

SLEEVES AND OPENINGS
All sleeves and openings shall be reviewed with A/E prior to proceeding with the work.

SEALING AND FIRESTOPPING
Sealing and firestopping of sleeves/openings between conduits, cable trays, wireways, troughs, cablebus, busduct, etc. and the structural or partition opening shall be the responsibility of the contractor whose work penetrates the opening. The contractor responsible shall hire individuals skilled in such work to do the sealing and firestopping. These individuals hired shall normally and routinely be employed in the sealing and fireproofing occupation.

WORK BY STATE

1. Existing Ccure 80000 Card Access and Security System server and software.

2. Asbestos abatement and PCB equipment (other than light fixture ballasts) removal and disposal, if required, will be by the State under separate contract.

3. Electrical Testing not described in these contract documents will be by the State under separate contract.

4. Access cards

5. Locksets

PROVISIONS FOR FUTURE WORK

Provisions have been made within the specifications to allow limited expansion of the system with subsequent additions of monitored and controlled sites. This includes, but is not limited to additional controllers, readers, inputs and outputs, and software updates.

INTENT

The Contractor shall furnish and install all the necessary materials, apparatus, and devices to complete the electrical equipment and systems installation herein specified, except such parts as are specifically exempted herein.

If an item is either called for in the specifications or shown on the plans, it shall be considered sufficient for the inclusion of said item in this contract. If a conflict exists within the Specifications or exists within the Drawings, the Contractor shall furnish the item, system, or workmanship which is the highest quality, largest, or most closely fits the DOT's intent (as determined by the DOT Project Manager). It must be understood that the details and drawings are diagrammatic. The Contractor shall verify all dimensions at the site and be responsible for their accuracy. Contractor shall provide wiring schematic to Owner as part of the record drawings.

All sizes as given are minimum except as noted.

Materials and labor shall be new (unless noted or stated otherwise), first class, and workmanlike, and shall be subject at all times to DOT's inspections, tests and approval from the commencement until the acceptance of the completed work.

Whenever a particular manufacturer's product is named, it is mentioned only to indicate the type, quality and function of the article, which will meet the intent of the specifications.

OMISSIONS
No later than 10 days before bid opening, the Contractor shall call the attention of the DOT to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

SUBMITTALS
Within 30 days after Notice to Proceed, the successful bidder shall furnish submittals to the DOT in accordance to the requirements of Division 1.

Submit the respective specification sections, marking each submittal with that specification section number. Mark general catalog sheets and drawings to indicate specific items being submitted and proper identification of equipment by name and/or number, as indicated in the contract documents. Failure to do this may result in the submittal(s) being returned to the Contractor for correction and resubmission. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.

On request from the DOT, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.

Submittals shall be grouped to include complete submittals of related systems, products, and accessories in a single submittal. Mark dimensions and values in units to match those specified. Include wiring diagrams of electrically powered equipment.

The above submittals must be approved before fabrication is authorized.

Submit sufficient quantities of submittals to allow the following distribution:

Operating and Maintenance Manuals	2 copies
DOT Project Representative	1 copy

PROJECT/SITE CONDITIONS
Install Work in locations shown on Drawings, unless prevented by Project conditions.

Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of DOT before proceeding.

Tools, materials and equipment shall be confined to areas designated by the DOT and tenant.

WORK SEQUENCE AND SCHEDULING
Install work in phases to accommodate tenant’s occupancy requirements. During the construction period coordinate electrical schedule and operations with DOT's Project Representative.

WORK BY OTHER TRADES
Div 26 work to be completed by a licensed electrician.

OFF SITE STORAGE
Not applicable.

REQUEST AND CERTIFICATE FOR PAYMENT
Contractor may submit invoices only after completion and acceptance of all work at the site. Standard Contractor invoice format is acceptable. Submit invoices to DOT Project Representative as directed.

SALVAGE MATERIALS
No materials removed from this project shall be reused. All materials removed shall become the property of and shall be disposed of by the Contractor.

CERTIFICATES AND INSPECTIONS
See the requirements of Division 1.

Obtain and pay for all required State installation inspections. Deliver originals of these certificates to the DOT's Project Representative. Include copies of the certificates in the Operating and Maintenance Instructions.

OPERATING AND MAINTENANCE INSTRUCTIONS
See Sections 017823.

Assemble material in three-ring or post binders, using an index at the front of each volume and tabs for each system or type of equipment. In addition to any data indicated in Section 017823 Operation and Maintenance Data, include the following information:

Copies of all approved submittals.
Manufacturer's wiring diagrams for electrically powered equipment
Records of tests performed to certify compliance with system requirements
Certificates of inspection by regulatory agencies
Parts lists for manufactured equipment
Preventive maintenance recommendations
Warranties
Additional information as indicated in the technical specification sections

TRAINING OF AGENCY PERSONNEL
Not Applicable.

RECORD DRAWINGS
The Contractor shall maintain at least one copy each of the specifications and drawings on the job site at all times.

See Section 017839 Project Record Documents for additional requirements. The DOT will provide the Contractor with a suitable set of contract drawings on which daily records of changes and deviations from contract shall be recorded. All buried or concealed piping, conduit, or similar items shall be located by dimensions and elevations on the record drawings.

The daily record of changes shall be the responsibility of Contractor's field superintendent. No arbitrary mark-ups will be permitted.

At completion of the project, the Contractor shall submit the marked-up record drawings to the DOT prior to submission of invoice.

PART 2 - PRODUCTS

ACCESS PANELS AND DOORS

Lay-in Ceilings:
Removable lay-in ceiling tiles in 2 x 2 foot or 2 x 4 foot configuration are sufficient; no additional access provisions are required unless specifically indicated.

Concealed Spline Ceilings:
Provide removable sections of ceiling tile held in position with metal slats or tabs compatible with the ceiling system used.

Metal Pan Ceilings:
Provide removable sections of ceiling tile held in position by pressure fit.

Plaster Walls and Ceilings:
16 gauge frame with not less than a 20 gauge hinged door panel, prime coated steel for general applications, stainless steel for use in toilets, showers and similar wet areas, concealed hinges, screwdriver operated cam latch for general application, key lock for use in public areas, UL listed for use in fire rated partitions if required by the application. Use the largest size access opening possible, consistent with the space and the equipment needed service; minimum size is 12" by 12".

IDENTIFICATION

See Section 280553.

SEALING AND FIRESTOPPING
FIRE AND/OR SMOKE RATED PENETRATIONS:

Manufacturers:
3M, STI/SpecSeal, Tremco, or approved equal.

All firestopping systems shall be provided by the same manufacturer.

Submittals:
Contractor shall submit product data for each firestop system. Submittals shall include product characteristics, performance and limitation criteria, test data, MSDS sheets, installation details and procedures for each method of installation applicable to this project. For non-standard conditions where no UL tested system exists, submit manufacturer's drawings for UL system with known performance for which an engineering judgment can be based upon.

Products:
Firestop systems shall be UL listed or tested by an independent testing laboratory approved by the Department of Commerce.

Use a product that has a rating not less than the rating of the wall or floor being penetrated. Reference architectural drawings for identification of fire and/or smoke rated walls and floors.

Contractor shall use firestop putty, caulk sealant, intumescent wrapstrips, intumescent firestop collars, firestop mortar or a combination of these products to provide a UL listed system for each application required for this project. Provide mineral wool backing where specified in manufacturer's application detail.

NON-RATED PENETRATIONS:
Conduit Penetrations Through Below Grade Walls:
In exterior wall openings below grade, use a modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the uninsulated conduit and the cored opening or a water-stop type wall sleeve.

Conduit and Cable Tray Penetrations:
At conduit and cable tray penetrations of non-rated interior partitions, floors and exterior walls above grade, use urethane caulk in annular space between conduit and sleeve, or the core-drilled opening.

PART 3 - EXECUTION

EXCAVATION AND BACKFILL
Not applicable.

CONCRETE WORK
Not applicable.

CUTTING AND PATCHING
See Section 017329 Cutting and Patching.

BUILDING ACCESS
Arrange for the necessary openings in the building to allow for admittance of all apparatus. When the building access was not previously arranged and must be provided by this contractor, restore any opening to its original condition after the apparatus has been brought into the building.

EQUIPMENT ACCESS
Install all piping, conduit, ductwork, and accessories to permit access to equipment for maintenance. Coordinate the exact location of wall and ceiling access panels and doors with the Owner, making sure that access is available for all equipment and specialties. Where access is required in plaster or drywall walls or ceilings, furnish and install suitable access doors.

WORKING CLEARANCES
Minimum installed equipment working clearances as required by the NEC Table 110-34(a) shall be used for voltages above 600 volt. The clearances shall be based on phase-to-phase voltage and condition 3 of that table.

COORDINATION
The Contractor shall cooperate with other trades and WisDOT's personnel in locating work in a proper manner. Should it be necessary to raise or lower or move longitudinally any part of the electrical work to better fit the general installation, such work shall be done at no extra cost to the WisDOT, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.

The Contractor shall verify that all devices are compatible for the surfaces on which they will be used. This includes, but is not limited to, devices, etc.

Coordinate all work with the WisDOT Project Representative prior to installation. Any installed work that is not coordinated and that interferes with other work shall be removed or relocated at the installing contractor's expense.

Cooperate with WisDOT in ensuring the completed system functions as intended. Verify system completion to the WisDOT. Demonstrate the starting, interlocking and control features of each system so the WisDOT can implement their data base programming.

SLEEVES
Pipe sleeves for conduits 6" in diameter and smaller, in new poured concrete construction, shall be schedule 40 steel pipe, plastic removable sleeve or sheet metal sleeve, all cast in place.

In wet area floor penetrations, top of sleeve to be 2 inches above the adjacent floor. In existing wet area floor penetrations, core-drill sleeve openings large enough to insert schedule 40 sleeve and grout the area around the sleeve. If the pipe penetrating the sleeve is supported by a pipe clamp resting on the sleeve, weld a collar or struts to the sleeve

that will transfer weight to the existing floor structure. Wet areas for this paragraph are rooms or spaces containing air handling unit coils, converters, pumps, chillers, boilers, and similar waterside equipment.

Pipe penetrations in existing concrete floors that are not in wet areas may omit the use of schedule 40 sleeve and use the core-drilled opening as the sleeve.

SEALING AND FIRESTOPPING

Fire and/or Smoke Penetrations:

Install approved product in accordance to the manufacturer's instructions where a pipe (i.e. cable tray, bus, cable bus, conduit, wireway, trough, etc.) penetrates a fire rated surface.

Where firestop mortar is used to infill large fire-rated floor openings that could be required to support weight, provide permanent structural forming. Firestop mortar alone is not adequate to support any substantial weight.

Non-Rated Penetrations:

When the opening is through a non-fire rated wall, floor, ceiling or roof the opening must be sealed using an approved type of material.

In exterior wall openings below grade, assemble rubber links of mechanical seal to the proper size for the conduit and tighten in place, in accordance to the manufacturer's instructions.

HOUSEKEEPING AND CLEAN UP

See Division 1 for additional requirements.

The Contractor shall clean up and remove from the premises, on a daily basis, all debris and rubbish resulting from its work and shall repair all damage to new and existing equipment resulting from its work. When job is complete, this Contractor shall remove all tools, excess material and equipment, etc., from the site.

END OF SECTION 280500

SECTION 280513.16 – ACCESS CONTROL COMMUNICATIONS CONDUCTORS AND CABLES

PART 1 - GENERAL

Applicable provisions of Conditions of the Contract shall apply to all work under this Section.

PART 1 - GENERAL
- Scope
- Related Work
- References
- Shop Drawing Submittals
- Qualifications
- Regulatory Requirements
- Project Conditions
- Coordination

PART 2 - PRODUCTS
- General
- Building Wire
- Wiring Connectors

PART 3 - EXECUTION
- General Wiring Methods
- Wiring Installation In Raceways
- Cable Installation
- Wiring Connections and Terminations
- Field Quality Control
- Wire and Cable Installation Schedule
- Wire Color
- Branch Circuits
- Emergency Circuits

SCOPE
Remote control and signal cable and wiring connectors.

RELATED WORK
Section 280500 – Common Work Results for Electronic Safety & Security
Section 280528.33 – Conduit and Boxes for Electronic Safety & Security
Section 280553 – Identification for Electronic Safety & Security

REFERENCES
ANSI/NFPA 70 – National Electrical Code.

SHOP DRAWING SUBMITTALS
Submit under provisions of Division 1.

Submit product data: Provide for each cable assembly type.

Submit factory test reports: Indicate procedures and values obtained.

Submit shop drawings for modular wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.

Submit manufacturer's installation instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

QUALIFICATIONS
Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

REGULATORY REQUIREMENTS
Conform to requirements of ANSI/NFPA 70.

Furnish products listed and classified by approved testing firm as suitable for purpose specified and shown.

PROJECT CONDITIONS
Verify that field measurements are as shown on Drawings.

Conductor sizes are based on copper.

Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.

Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

COORDINATION
Coordinate Work under Section 280500.

Determine required separation between cable and other work.

Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

GENERAL

All wire shall be new, delivered to the site in unbroken cartons and shall be less than one year old out of manufacturer's stock.

All conductors shall be copper.

Insulation shall have a 600 volt rating.

In mechanical rooms, light fixtures, and other high temperature applications, the insulation shall be rated 90 degrees C. Other areas shall use insulation rated 75 degrees C unless stated otherwise in other parts of these specifications and drawings.

All conductors must be suitable for the application intended. Conductors #10 and larger must be stranded. Conductors #12 and smaller may be solid or stranded with the following requirements or exceptions:

All conductors terminated with crimp type devices must be stranded.

Stranded conductors may only be terminated with UL OR ETL Listed type terminations or methods: e.g. stranded conductors may not be wrapped around a terminal screw but must be terminated with a crimp type device if a terminal screw is used or must be terminated in an approved back wired method.

BUILDING WIRE

Feeders and branch circuits: Type THW, THHN/THWN, XHHW.

Exterior underground circuits: Type XHHW or USE.

Control Cable for Class 1 Remote Control and Signal Circuits: 600 volt insulation, individual conductors twisted together and covered with an overall PVC jacket. Cable shall be Listed, temperature rated, and plenum or non-plenum rated for the application as required in the National Electrical Code.

Control Cable for Class 2 or Class 3 Remote Control and Signal Circuits shall be constructed, Listed, temperature rated, and plenum or non-plenum rated for the application as required in the NEC Article 725.

WIRING CONNECTORS

Split Bolt Connectors: Not acceptable.

Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment pads or terminals. Not approved for splicing.

Spring Wire Connectors: Solderless spring type pressure connector with insulating covers for copper wire splices and taps. Use for conductor sizes 10 AWG and smaller.

All wire connectors used in underground or exterior pull boxes shall be gel filled twist connectors or a connector designed for damp and wet locations.

Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; beveled cable entrances.

Compression (crimp) Connectors: Long barrel; seamless, tin-plated electrolytic copper tubing; internally beveled barrel ends. Connector shall be clearly marked with the wire size and type and proper number and location of crimps.

PART 3 - EXECUTION

GENERAL WIRING METHODS

All wire and cable shall be installed in conduit or raceway.

Do not use wire smaller than 12 AWG for power and lighting circuits, 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.

All conductors shall be sized to prevent excessive voltage drop at rated circuit ampacity. As a minimum use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 100 feet (30 m), for emergency lighting and exit sign wiring, and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet (61 m).

Make conductor lengths for parallel conductors equal.

Splice only in junction or outlet boxes.

Identify ALL low voltage, 600v and lower, wire per section 28 05 53.

Neatly train and lace wiring inside boxes and equipment.

WIRING INSTALLATION IN RACEWAYS

Pull all conductors into a raceway at the same time.

Completely and thoroughly swab raceway system before installing conductors.

Place all conductors of a given circuit (this includes phase wires, neutral (if any), and ground conductor) in the same raceway. If parallel phase and/or neutral wires are used, then place an equal number of phase and neutral conductors in same raceway or cable.

CABLE INSTALLATION
Low voltage control or signal cables: Provide protection for exposed cables where subject to damage.

Support exposed low voltage cables above accessible ceilings; do not rest on ceiling tiles. Include bridle rings or drive rings as necessary. DO NOT SUPPORT CABLES FROM OTHER EQUIPMENT.

Use suitable cable fittings and connectors.

WIRING CONNECTIONS AND TERMINATIONS
Splice only in accessible junction boxes.

Wire splices and taps shall be made firm, and adequate to carry the full current rating of the respective wire without soldering and without perceptible temperature rise.

All splices shall be so made that they have an electrical resistance not in excess of 2 feet (600 mm) of the conductor.

Use solderless spring type pressure connectors with insulating covers for wire splices and taps, 10 AWG and smaller.

Use mechanical or compression connectors for wire splices and taps, 8 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150 percent of the insulation value of conductor.

Thoroughly clean wires before installing lugs and connectors.

At all splices and terminations, leave tails long enough to cut splice out and completely re-splice.

All end of line resistors shall be terminated at each device as required, not within a panel.

FIELD QUALITY CONTROL
Field inspection and testing will be performed as required by WisDOT.

WIRE AND CABLE INSTALLATION SCHEDULE
Interior Locations: Building and control wire in raceways.

Above Accessible Ceilings: Building wire in raceways. Modular wiring system. Control wire in raceways or if rated for the application, may be installed without conduit if properly supported.

Exterior Locations: Building and control wire in raceways

High Temperature Areas (light fixtures and mechanical rooms): Building wire rated 90 degrees C. in raceways.

WIRE COLOR
General:
For wire sizes 10 AWG and smaller - Wire shall be colored as indicated below.

In existing facilities, use existing color scheme.

Neutral Conductors: White. Where there are two or more neutrals in one conduit, each shall be individually identified with the proper circuit. See requirements of NEC 200-6, 200-7, 210-4, and 310-12.

Branch Circuit Conductors: Three or four wire home runs shall have each phase uniquely color coded.

Ground Conductors: Green for 6 AWG and smaller.

BRANCH CIRCUITS
Each of the branch circuits, as defined herein, shall be furnished and installed with an accompanying neutral, sized the same as the phase conductor.

EMERGENCY CIRCUITS
All emergency system wiring shall be installed in raceways separate from all other systems.

END OF SECTION 280513.16

SECTION 280528.29 – HANGERS AND SUPPORTS FOR ELECTRONIC SAFETY & SECURITY

PART 1 - GENERAL

Applicable provisions of Conditions of the Contract shall apply to all work under this Section.

PART 1 - GENERAL
Scope
Related Work
Quality Assurance

PART 2 - PRODUCTS
Material

PART 3 - EXECUTION
Installation

SCOPE
Conduit and equipment supports, straps, clamps, steel channel, etc, and fastening hardware for supporting electrical work.

RELATED WORK
Section 280500 – Common Work Results for Electronic Safety & Security
Section 280528.33 – Conduit and Boxes for Electronic Safety & Security

QUALITY ASSURANCE
Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

PART 2 - PRODUCTS

MATERIAL
Support Channel: Galvanized.

Hardware: Corrosion resistant.

PART 3 - EXECUTION

INSTALLATION
Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors and beam clamps. Do not use spring steel clips and clamps.

File and de-burr cut ends of support channel and spray paint with cold galvanized paint to prevent rusting.

Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.

Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit.

Do not use powder-actuated or plastic anchors.

Do not drill structural steel members unless approved by DOT Project Representative.

Fabricate supports from galvanized structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
Install surface-mounted cabinets and panelboards with minimum of four anchors. Provide steel channel supports to stand cabinet one inch (25 mm) off wall.
Furnish and install all supports as required to fasten all electrical components required for the project, including free standing supports required for those items remotely mounted from the building structure, catwalks, walkways etc.

Minimum sized threaded rod for supports shall be 3/8”.

Conduit clamps, straps, supports, etc., shall be steel or malleable iron. One-hole straps shall be heavy duty type. All straps shall have steel or malleable backing plates when conduit is installed on the interior or exterior surface of any exterior building wall.

END OF SECTION 280528.29

SECTION 280528.33 – CONDUITS AND BOXES FOR ELECTRONIC SAFETY & SECURITY

PART 1 - GENERAL

Applicable provisions of Conditions of the Contract shall govern all work under this Section. WisDOT will provide, under separate contract, installation of access control equipment and wiring. This section shall provide empty conduit and boxes as required for installation.

PART 1 - GENERAL
- Scope
- submittals
- Related Work

PART 2 - PRODUCTS
- Electrical Metallic Tubing and Fittings
- Conduit Supports
- General
- Outlet Boxes
- Pull and Junction Boxes

PART 3 - EXECUTION
- Conduit Sizing, Arrangement and Support
- Conduit Installation
- Conduit Installation Schedule
- Coordination of Box Locations
- Outlet Box Installation
- Pull and Junction Box Installation

SCOPE
Raceways shall be installed as a complete system continuous from service to outlet or equipment, mechanically and electrically connected, constituting a continuous ground system.

All wall and ceiling outlet boxes, floor boxes, pull and junction boxes for power, lighting, fire alarm, and telecommunications including fiberoptic installations

All boxes shall be of sufficient size to provide free space for all conductors enclosed in the box and shall comply with Article 370 and Table 370-16(a) of the National Electric Code.

SUBMITTALS
See Section 280500.

RELATED WORK
Section 280500 – Common Results for Electronic Safety & Security
Section 280528.29 – Hangers and Supports for Electronic Safety & Security
Section 283100 – Fire alarm system

PART 2 - PRODUCTS

ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS
Conduit: Steel, galvanized tubing.

Fittings: All steel, set screws, water tight, concrete tight. No push-on or indenter types permitted. All set screw fittings larger than 1" shall have hex head type screws tightened to manufactures' specifications. Set screw fittings 1" and smaller can have slotted type screws tightened as recommended by the manufacturer.

Conduit Bodies: All steel threaded conduit bodies.

CONDUIT SUPPORTS
See Section 280528.29

GENERAL
All steel fittings and conduit bodies shall be galvanized.

No cast metal, split or gland type fittings permitted.

All conduit covers must be fastened to the conduit body with screws and be of the same manufacture.

OUTLET BOXES
Sheet Metal Outlet Boxes: galvanized steel, with stamped knockouts.

Cast Boxes: Cast ferroalloy, or aluminum type deep type, gasket cover, threaded hubs.

PULL AND JUNCTION BOXES
Pull boxes and junction boxes shall be minimum 4 inch square (100 mm) by 2 1/8th inches (54 mm) deep for use with 1 inch (25 mm) conduit and smaller. On conduit systems using 1 1/4 inch (31.75 mm) conduit or larger, pull and junction boxes shall be sized per NEC but not less than 4 11/16 inch square (117 mm).

For fiber optic, security, and other low voltage cable installations the NEC box size requirements shall apply. All boxes, used on telecommunication, security, other low voltage and fiber optic systems with conduits of 1 1/4" and larger, shall be sized per the NEC conduit requirements. For determining box size, the conduit is the determining factor, not the wire size.

Sheet Metal Boxes: code gauge galvanized steel, screw covers, flanged and spot welded joints and corners.

Sheet Metal Boxes Larger Than 12 Inches (300 mm) in any dimension shall have a hinged cover or a chain installed between box and cover.

Cast Metal Boxes for Outdoor and Wet Location Installations: Type 4 and Type 6, flat flanged, surface mounted junction box, UL listed as raintight. Galvanized cast iron or aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

Box extensions and adjacent boxes within 48” of each other are not allowed for the purpose of creating more wire capacity.

Junction boxes 6" x 6" or larger size shall be without stamped knock-outs.

Wireways shall not be used in lieu of junction boxes.

PART 3 - EXECUTION

CONDUIT SIZING, ARRANGEMENT, AND SUPPORT

EMT is permitted to be used in sizes 4" (50 mm) and smaller for power and telecommunication systems.

Size power conductor raceways for conductor type installed or for Type THW conductors, whichever results in larger conduit. Conduit size shall be 3/4 inch (19 mm) minimum except as specified elsewhere or with Engineer's specific approval for each application. Conduit for all other wiring, including but not limited to data, control, security, fire alarm, telecommunications, signal, video, etc. shall be sized per number of conductors pulled and their cross-section. 40% fill shall be maximum for all new conduit fills.

Arrange conduit to maintain headroom and present a neat appearance. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.

Maintain minimum 6 inch (150 mm) clearance between conduit and piping. Maintain 12 inch (300 mm) clearance between conduit and heat sources such as flues, steam pipes, and heating appliances.

Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized pipe straps, conduit racks (lay in adjustable hangers), clevis hangers, or bolted split stamped galvanized hangers.

Group conduit in parallel runs where practical and use conduit rack (lay in adjustable hangers) constructed of steel channel with conduit straps or clamps. Provide space for 25 percent additional conduit.

Do not fasten conduit with wire or perforated pipe straps. Before conductors are pulled, remove all wire used for temporary conduit support during construction.

Support and fasten metal conduit at a maximum of 8 feet (2.4 m) on center.

Supports shall be independent of the installations of other trades, e.g. ceiling support wires, HVAC pipes, etc., unless so approved or detailed.

In general, all conduit shall be concealed except where noted on the drawings or approved by the WisDOT Project Representative. Contractor shall verify with WisDOT Project Representative all surface conduit installations.

Changes in direction shall be made with symmetrical bends, cast steel boxes, stamped metal boxes or cast steel conduit bodies.

No continuous conduit run shall exceed 100 feet (30 meters) without a junction box.

Existing conduit and raceways may be reused if properly supported and adequately sized in accordance to the specifications. No existing raceway may be reused where existing conductor fill exceeds the amount as stated in the specifications.

CONDUIT INSTALLATION

Cut conduit square using a saw or pipecutter; de-burr cut ends.

Bring conduit to the shoulder of fittings and couplings and fasten securely.

Use conduit hubs for fastening conduit to cast boxes. Use sealing locknuts or conduit hubs for fastening conduit to sheet metal boxes in damp or wet locations (sheet metal boxes 4 & 11/16th" square and larger, shall contain NO pre-punched or concentric knockouts).

All conduit terminations (except for terminations into conduit bodies) shall use connectors or conduit hubs with one locknut or shall use double locknuts (one each side of box wall) and insulating bushing. Provide bushings for the ends of all conduit not terminated in box walls.

Install no more than the equivalent of three 90 degree bends between boxes. Conduit shall be bent according to manufacturer's recommendations.

Use suitable conduit caps or other approved seals to protect installed conduit against entrance of dirt and moisture.

Provide 1/8 inch (3 mm) nylon pull string in empty conduit, except sleeves and nipples.

Install expansion deflection joints where conduit crosses building expansion joints. Note: expansion-deflection joints are not required where conduit crosses building control joints if the control joint does not act as an expansion joint.

Avoid moisture traps where possible. Where moisture traps are unavoidable, provide junction boxes with drain fittings at conduit low points.

Where conduit passes between areas of differing temperatures such as into or out of cool rooms, freezers, unheated and heated spaces, buildings, etc., provide Listed conduit seals to prevent the passage of moisture and water vapor through the conduit.

Route conduit through roof openings for piping and ductwork where possible.

Ground and bond conduit as required.

CONDUIT INSTALLATION SCHEDULE
Concealed Dry Interior Locations: Electrical metallic tubing.

Exposed Dry Interior Locations: Electrical metallic tubing.

COORDINATION OF BOX LOCATIONS
Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.

No outlet shall be located where it will be obstructed by other equipment, piping, lockers, benches, counters, etc. In case of any question over the location of an outlet, the Contractor shall refer the matter to the WisDOT Project Representative and install outlet as instructed.

The proper location of each outlet is considered a part of this contract and no additional compensation will be paid to the Contractor for moving outlets which were improperly located.

Locate and install boxes to allow access to them. Where installation is inaccessible, coordinate locations and provide access doors per Section 280500.

Locate and install to maintain headroom and to present a neat appearance.

Install boxes to preserve fire resistance rating of partitions and other elements, using approved materials and methods.

OUTLET BOX INSTALLATION

Power: Recessed (1/4" maximum) outlet boxes in masonry, drywall, concrete or tile construction shall be masonry type; minimum 4 inch square with 4 inch square-cut device covers. Coordinate masonry cutting to achieve neat openings for boxes.

Tele/Data/Comm: Recessed (1/4" maximum) outlet boxes in masonry, drywall, concrete or tile construction shall be masonry type; minimum 4 11/16 inch square with 4 11/16 inch square-cut device covers. Coordinate masonry cutting to achieve neat openings for boxes.

Provide knockout closures for unused openings.

Support boxes independently of conduit except for cast boxes that are connected to two rigid metal conduits, both supported within 12 inches (300 mm) of box.

Use multiple gang boxes where more than one device are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.

Install boxes in walls without damaging wall insulation.

Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.

Align wall mounted outlet boxes for switches, thermostats, and similar devices.

Provide cast ferroalloy outlet boxes in exterior locations [exposed to the weather] and wet locations.

PULL AND JUNCTION BOX INSTALLATION

Locate pull boxes and junction boxes above accessible ceilings, in unfinished areas or furnish and install WisDOT approved access panels in non-accessible ceilings where boxes are installed.

Support pull and junction boxes independent of conduit.

Box covers shall be stenciled indicating usage and voltage in letters not less than 1 inch (25 mm) high.

END OF SECTION 280528.33

SECTION 280528.39 – SURFACE RACEWAYS FOR ELECTRONIC SAFETY & SECURITY

PART 1 - GENERAL

Applicable provisions of Division 1 shall govern all work under this Section.

PART 1 - GENERAL
Scope
Related Work

PART 2 - PRODUCTS
Surface Metal Raceway

PART 3 - EXECUTION
Installation

SCOPE

Surface raceways include surface metal and nonmetal raceways, multi outlet assemblies, auxiliary gutters (wireways) and wall duct.

RELATED WORK

Section 280500 – Common Work Results for Electronic Safety & Security
Section 280513.16 – Access Control Communications Conductors & Cables

PART 2 - PRODUCTS

SURFACE METAL RACEWAY

Description: Sheet metal channel with fitted cover, suitable for use as surface metal raceway.

PART 3 - EXECUTION

INSTALLATION

Use flat head screws to fasten channel to surfaces every 24 inches. Mount plumb and level.

Use suitable insulating bushings and inserts at connections to outlets and corner fittings.

Maintain grounding continuity between raceway components to provide a continuous grounding path as required.

Fastener Option: Use clips and straps suitable for the purpose.

END OF SECTION 280528.39

SECTION 280553 – IDENTIFICATION FOR ELECTRONIC SAFETY & SECURITY

PART 1 - GENERAL

Applicable provisions of Division 1 shall apply to all work under this Section.

PART 1 - GENERAL
Scope
Related Work
Reference Standards
Submittals

PART 2 - PRODUCTS
Materials

PART 3 - EXECUTION
General
Power and Control Wire Identification
Nameplate Engraving and Stenciling
Panel Directories

SCOPE

This section describes the products and execution requirements relating to labeling of security system. Further, this section includes labeling of all terminations and related sub-systems, including but not limited to nameplates, stenciling, wire and cable marker, and terminating equipment.

RELATED WORK

Section 280500 – Common Work Results for Electronic Safety & Security
Section 280513.16 – Access Control Communications Conductors & Cables

REFERENCE STANDARDS

Wisconsin State Electrical Code - Volumes 1 & 2
[NEMA, UL, EIA/TIA, and ANSI standard where applicable standards have been established.]

SUBMITTALS

Submit shop drawings under provisions of Section 280500.

Include schedule for nameplates and stenciling.

Prior to installation, the Contractor shall provide samples of all label types planned for the project. These samples shall include examples of the lettering to be used. Samples shall be mounted on 81/2" x 11" sheets annotated, explaining their purposed use.

PART 2 - PRODUCTS

MATERIAL

Labels: All labels shall be permanent, and be machine generated.

Label size shall be appropriate for the conductor or cable size(s), outlet faceplate layout and patch panel design. All labels shall be self-laminating, white/transparent vinyl and be wrapped around the cable. Flag type labels are not allowed. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminate over the full extent of the printed area of the label. Adhesive type labels not permitted except for phase and wire identification.

Nameplates: Engraved three layer laminated plastic, black letters on a white background.

Stenciling: Black paint. Emergency system stenciling shall use red paint.

PART 3 - EXECUTION

GENERAL

All branch circuit and power panels must be identified with the same symbol used in circuit directory in main distribution center.

Clean all surfaces before attaching labels with the label manufacturer's recommended cleaning agent.

Install all labels firmly as recommended by the label manufacturer.

Install nameplates parallel to equipment lines.

Secure nameplates to equipment fronts using screws, or rivets. Secure nameplate to inside of recessed panelboards in finished locations.

Embossed tape will not be permitted for any application.

POWER AND CONTROL WIRE IDENTIFICATION

Provide wire markers on each conductor in panelboard gutters, pull boxes, outlet and junction boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated.

NAMEPLATE ENGRAVING

Provide nameplates to identify all electrical distribution and control equipment, and loads served.

Individual Circuit Breakers, Enclosed Switches, and Motor Starters: 1/4 inch (6 mm); identify load served.

Junction boxes: 1/2 inch (13 mm); identify system source(s) and load(s) served.

PANEL DIRECTORIES

Typed directories for panels must be covered with clear plastic, have a metal frame, and should be spelled out in specifications. Room number on directories shall be Owner's numbers, not Plan numbers unless Owner so specifies. Owner will provide panel directory format.

END OF SECTION 280553

SECTION 281300 – ACCESS CONTROL

PART 1 - GENERAL

Applicable provisions of Division 1 shall apply to all work under this Section.

PART 1 - GENERAL
- Scope
- Related Work
- Design Requirements
- Miscellaneous
- Submittals
- General
- System Features
- Product Availability
- Qualifications

PART 2 - PRODUCTS
- Wire and Cable
- Lightning Protection
- Power Supplies
- Controller
- Proximity Card Reader
- Proximity Key Cards
- Associated Equipment
- Warranty

PART 3 - EXECUTION
- System Startup
- Owner's Instructions
- Commissioning
- Preparation
- Installation
- Workmanship
- Equipment Pre-Test
- Wire and Cable
- Wire and Cable Terminations
- Conduit and Raceway Installation
- Penetrations
- Fire Rated Doors and Frames
- Grounding
- Power to Security Equipment
- Cutting and Patching
- Plywood Backing
- Spare Parts

SCOPE
Provide a complete operating Card Access system. The card access system shall be fully compatible with existing card access system of other facilities. The System shall include proximity card readers, controllers, power supplies, wiring, and all other equipment necessary for the complete specified operation with the existing WisDOT System.

Design coordination shall be with Terry Wendt at (608) 266-7910, terry.wendt@dot.wi.gov.

The contractor shall be responsible for providing final working drawings based on the information described in the drawings and his field observations. Contract documents indicate design intent and do not show all details required for a complete system. The contractor shall make their own determination of installation requirements.

RELATED WORK
Section 280500 – Common Work Results for Electronic Safety & Security
Section 280513.16 – Access Control Communications Conductors & Cables
Section 280528.29 – Hangers & Supports for Electronic Safety & Security
Section 280528.33 – Conduit and Boxes for Electronic Safety & Security
Section 280528.39 – Surface Raceways for Electronic Safety & Security
Section 280553 – Identification for Electronic Safety & Security

DESIGN REQUIREMENTS
Project drawings represent the level of system design to be provided by Contractor. Contractor shall provide all additional system design work required, including but not limited to:

- Conduit layout and sizing.
- Wire and cable layout and sizing.
- Point-to-point wiring and equipment hook-up information.
- Equipment mounting details.
- Design of equipment cabinets.
- Other detailed design work required.

Contractor's design shall conform to all applicable codes and ordinances. All electrical design, including sizing and placement of conduit, raceways and conductors shall be in accordance to NFPA 70: National Electrical Code, 1996 unless local codes establish more stringent requirements.

Contractor's design work will be reviewed and approved by the State’s Project Representative.

MISCELLANEOUS
Contractor shall make all necessary connections/terminations and punch downs for all devices.

SUBMITTALS
See Section 280500.

Submit product data:
Card reader
Controller
Associated Equipment
Request to Exits
Door Contacts

Submit the following information:
Maintenance agreements
Qualifications
Proposed installation schedule

GENERAL
All products provided by Contractor shall be new and unused, and shall be of manufacturer's current and standard production.

Where two or more equipment items of the same kind are provided, all shall be identical and provided by the same manufacturer.

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. Contractor shall provide all components needed for complete and satisfactory operation.

SYSTEM FEATURES
The system shall utilize controllers and add-on boards as appropriate for the specific installation. Controllers shall be fully integrated with the existing Software House CCure 8000 system, and shall be of the latest design with the current version of firmware used by the WisDOT. Access cards shall be 35-bit cards compatible with existing HID brand Corporate 1000 cards currently used by the WisDOT; numbering shall be coordinated by the factory with the existing WisDOT card database. Cardreaders shall be compatible with existing WisDOT access cards. Each reader shall be the model and size most appropriate for the individual door application.

PRODUCT AVAILABILITY
Contractor, prior to submitting a proposal, shall determine product availability and delivery time, and shall include such considerations into his proposed Hard Schedule.

QUALIFICATIONS
Contractor: Company specializing in installing products as specified in this section with a minimum of 5 years documented experience. Any system proposed shall be in operation in a non-test environment. Provide a list of installations of similar size with bid documents.

Contractor shall prove their ability to install and maintain similar systems.

Contractor shall be a factory-authorized integrator with full authority to install and maintain systems compatible with the existing CCure 800 system.

Contractor shall show evidence that they can provide the necessary maintenance support for the proposed system. This should include:

1. Identification of adequate staffing to meet stated response time to minimize system down time.

2. List recent customer references that have had similar systems installed in a similar environment.

3. Specify which office(s) shall be responsible for maintaining the system.

4. Identify the number of technicians in the supporting office who have been factory trained on installation and maintenance.

The contractor/installer of the selected system is solely responsible for all equipment, software, etc., and third-party contractors used in any and all capacities, as they relate to meeting all codes, OSHA requirements, compatibility, etc. The installer shall assume all responsibilities in meeting these requirements, laws, compatibility needs, etc.

Certain products specified may only be available through factory-authorized dealers and distributors. Contractor shall verify his ability to procure the products specified prior to submitting a proposal.

PART 2 - PRODUCTS

WIRE AND CABLE

See Section 280513.16.

Wire and cable shall be sized to provide minimum voltage drop and minimum resistance to the devices being supplied.

All cables shall comply with equipment manufacturer recommendations for wire and cable.

All cables shall be plenum rated where required and specifically designed for their intended use.

Comply with all applicable codes and ordinances.

LIGHTNING PROTECTION
Contractor shall provide suitable lightning protection on all power and data connections for all processors/controllers.

All lightning protection equipment shall be UL listed.

POWER SUPPLIES
Provide UL listed power supplies. Power supplies shall include battery powered uninterruptible supply system. Provide battery backup sufficient to operate all system components including controllers, locks, request-to-exit devices, and data communications equipment associated with the security system for a minimum of four hours.

CONTROLLER
Controllers shall be Software House iStar controllers compatible with the State's existing CCure 8000 system. The model(s) of iStar controller(s) to be installed shall be selected on the basis of most economical configuration with consideration given to future expansion. Each controller shall be connected to the server by network connection.

The controller shall provide for additional multiple inputs and outputs for monitored devices and controlled devices. Additional input and output board shall be supplied as necessary.

The controller cabinet shall be supplied with a key lockable door (all controllers keyed alike). Provide a tamper switch to supervise the status of the access doors and activate an immediate alarm condition at the assigned CPU. After the door is opened, the switch shall be capable of an override position to clear the tamper condition. Closing the door shall automatically re-arm the switch.

PROXIMITY CARD READER
The proximity reader shall be as manufactured by HID Corporation. Unit shall provide EIA RS232, RS-485, and 26 and 35 bit Wiegand output. The reader shall be connected in the Wiegand output format. Any other protocol is not acceptable. Each card reader shall be labeled under the front cover plate. Labeling shall include the card reader name/number and the controller to which it is connected. If used, RM-4 junction boxes shall identify the associated reader and controller.

Two LEDs, panel mounted with the following status indications shall be provided:

Solid Red – Door locked, ready for new card.
Alternating Red/Green – door unlocked or in alarm
An audible tone shall indicate that an access card was read.

Construction: Card reader shall be sealed, waterproof, weather resistant and tamper-proof. The cardreader shall be designed to operate properly within relative humidity range of 0% to 100% condensing and within a temperature range -50ºF to +180ºF. Material shall be Lexan or equal.

Mounting: Card reader shall be designed to be mounted and operated on or behind any surface including metallic surfaces and glass.

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 cardreader at any power level shall not compromise the system.

General: Cardreader shall connect to controller via cable as specified by the manufacturer. All required power shall come from controller via cable. As a minimum, cardreader shall detect card codes when a card is within 4" of its surface.

Diagnostics: Cardreader and line integrity shall be monitored continuously and shall alarm if failure is detected.

PROXIMITY KEY CARDS
DOT uses ProxCard II ("State Corporate 1000 Cards") as manufactured by HID Corporation. All equipment installed under this contract shall be compatible with this card type.

ASSOCIATED EQUIPMENT
Approved input and output devices shall include:

DOOR STRIKES:
Folger Adams, Von Duprin, or HES. Voltage shall be 24VDC. Voltage shall be the same for all strikes and other door locking devices in the building. Includes all required conduit, mounting hardware and relays.

REQUEST-TO-EXIT MOTION DETECTORS:
Detection Systems, Sentrol or other make manufactured specifically for request-to-exit application.

DOOR CONTACTS:
Must have SPDT contacts. Models designed for concealed mounting shall be used whenever possible. Must be compatible with existing security systems installed on the premises.

WARRANTY
Contractor warrants that all work furnished (material and labor) under this contract will be of good quality, free from faults and defects, and in conformance with the Project Drawings and Specifications.

Contractor shall provide a parts and labor guarantee on all work. Unless otherwise specified herein, Contractor's guarantee shall be for a period of two years from date of acceptance, except where any specific guarantees from a supplier or equipment manufacturer extends for a longer time.

Contractor's guarantee shall cover all costs associated with troubleshooting, repair and replacement of defective work, including costs of labor, transportation, lodging, materials and equipment.

Guarantee shall not cover any damage to material or equipment caused by accident, misuse, unauthorized modification or repair by Client, or acts of god.

Contractor shall promptly respond to Client's requests for service during the guarantee period. Contractor shall provide repair service as soon as reasonably possible upon request from Client, but in no case shall service response exceed 8 hours from time of request.

PART 3 - EXECUTION

SYSTEM STARTUP

Power shall only be applied to the system after re-checking for proper grounding of the system and measuring all loops for lack of shorts, grounds, and open circuits.

System supplier shall be responsible for coordinating all hardware programming of the system with the WisDOT. Coordinate all door functions with WisDOT.

OWNER'S INSTRUCTIONS

Contractor shall closely schedule and coordinate his activities with the State’s Project Representative.

Coordinate with the owner all operating, and monitoring functions which shall be included within the programming.

Buildings and rooms must be able to be secured at all times.

COMMISSIONING

After all work is completed and prior to requesting acceptance test, Contractor shall conduct a final inspection and pre-test all equipment and system features. Each building shall be acceptance tested individually when completed. Contractor shall correct any deficiencies discovered as the result of the inspection and pre-test of all contractor installed equipment and materials.

Contractor shall submit a request for the acceptance test in writing to the State’s Project Representative no less than fourteen days prior to the requested test date. The request for acceptance test shall be accompanied by a certification from Contractor that all work is complete and has been pre-tested, and that all corrections have been made.

During acceptance test, Contractor shall demonstrate all equipment and system features to WisDOT. Contractor shall remove covers, open wiring connections, operate equipment, and perform other reasonable work as requested by the State's Project Representative.

Any portions of the work found to be deficient or not in compliance with the Project Drawing and Specifications will be rejected. The State's Project Representative will prepare a list of any such deficiencies observed during the acceptance test. Contractor shall promptly correct all deficiencies. Upon correction of deficiencies, Contractor shall submit a request in writing to the State's Project Representative for another acceptance test.

If, at the conclusion of the acceptance test, all work is found to be acceptable and in compliance with the Project Drawings and Specifications, the State's Project Representative will issue a Certificate of Substantial Completion to Contractor.

PREPARATION

Contractor shall order all required parts and equipment upon notification of award of the work.

Contractor shall verify power where required.

INSTALLATION

Each equipment enclosure shall be securely mounted. Field visit is strongly recommended for each installation site to determine mounting requirements and space limitations.

Contractor shall install power supplies and controllers, provide raceways, boxes, and 24VDC conductors from supplies to controllers.

Contractor shall coordinate with the State's Project Representative for placement of ALL controllers.

Contractor shall carefully follow the instructions in the manufacturers' Installation Manual to insure all steps have been taken to provide a reliable, easy to operate system.

Perform all work as indicated in the drawings and specifications.

All communications cables shall be kept away from power circuits.

Contractor shall install the power supply for electric locks in locations where they won't interfere with other operations.

Contractor shall also execute adequate testing of the system to insure proper operation.

WORKMANSHIP
Perform work with persons experienced and qualified to produce workmanship specified.

Comply with highest industry standards, except when specified requirements indicate more rigid standards or more precise workmanship.

Maintain quality control over suppliers and Subcontractors.

Quality of workmanship is considered important. The State's Project Representative will have the authority to reject work that does not conform to the Drawings and Specifications.

EQUIPMENT PRE-TEST
All equipment shall be bench tested prior to delivery to job site and prior to installation. Bench test per manufacturers installation instructions.

WIRE AND CABLE
See Section 280513.16

Design, layout, size, and plan new wire and cable runs as required.

All wire and cable passing through metalwork shall be sleeved by an approved grommet or bushing.

Avoid splicing conductors. All splices shall be made in junction boxes (except at equipment). Splices shall be made with an approved crimp connection.

Identify all wire and cable at terminations and at every junction box. Identification shall be made as specified in Section 280553.

WIRE AND CABLE TERMINATIONS
Identify all inputs and outputs on terminal strips with permanent marking labels.

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.

Install connectors as required by equipment manufacturers.

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.

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.

CONDUIT AND RACEWAY INSTALLATION
See Sections 280528.29, 280528.33 and 280528.39.

Design, layout, size and plan new conduit and raceway systems as required.

PENETRATIONS
Do not penetrate any roof, flashing, exterior wall, or parapet without prior approval from the State's Project Representative.

FIRE RATED DOORS AND FRAMES
Do nothing to modify a UL. rated door or frame that would void the UL label or fire rating.

GROUNDING
Provide grounding of equipment as required by equipment manufacturer.

POWER TO SECURITY EQUIPMENT
Provide power to all equipment from a new 120VAC circuit dedicated for access system use from the existing emergency system. All panel circuit breakers will be labeled "Security Equipment - Do Not Operate" or equivalent. If not available, connect to an emergency panel dedicated branch circuit. If not available, connect to a dedicated branch circuit.

All plug-in transformers shall be located within locked security control panels. Secure all low-voltage plug-in transformers to outlet with screw or strap. Clearly label all transformers to identify purpose and use.

Batteries shall be separated from access control equipment. Mount batteries in separate locked security enclosures.

CUTTING AND PATCHING
Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the work.

EQUIPMENT ENCLOSURE PLYWOOD BACKING
Contractor is responsible for providing plywood backing at all panel locations where not already present or where there is insufficient room remaining on existing plywood backing to permit proper panel installation.

SPARE PARTS
Not included in the scope of this contract.

END OF SECTION 281300

SECTION 283100 – FIRE DETECTION AND ALARM

PART 1 - GENERAL

SCOPE

The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations associated with the installation of the new Fire Alarm System as shown on the drawings and as herein specified. Included are the following topics:

PART 1 - GENERAL
- Scope
- Related Work
- Description of Work
- Regulatory Requirements
- Manufacturer Provided Services
- Quality Assurance
- Qualifications
- Submittals
- Project Record Drawings
- Operation and Maintenance Manuals
- Product Delivery, Storage and Handling
- Spare Parts
- Supervision
- Power Requirements

PART 2 - PRODUCTS
- Enclosures
- Multiplex/Intelligent Fire Alarm Control Panel
- Operation - Multiplex/Intelligent Fire Alarm System
- Fiber Optic Communication Network Interface
- Central Monitoring
- One Way Voice Communication Sub System
- Operation - One Way Voice Communication
- Remote Annunciator/Fire Command Center Panels
- NAC Booster Panels (Remote Power Supplies)
- Multiplex/Intelligent Peripheral devices
- Fault Isolator Module (FIM)
- Conventional Peripheral Devices
- Audio Visual Notification Appliances
- Smoke Detectors within Resident Units/Dorm Rooms
- Printers and Terminals
- Special Devices

PART 3 - EXECUTION

General
Raceways
Free Air Wiring
Conductors
Device Mounting
Identifications
Manufacturer's Services
Testing
Warranty
Training
Maintenance Contract
Special Considerations
Construction Verification Items

RELATED WORK

The work covered by this section of the specifications shall be coordinated with the related work as specified elsewhere under the following project sections:

Section 260500 – Common Work Results for Electrical
Section 260526 – Grounding and Bonding for Electrical Systems
Section 260529 – Hangers and Supports for Electrical Systems
Section 260533 – Raceway and Boxes for Electrical Systems
Section 260553 – Identifications for Electrical Systems
Section 262726 – Wiring Devices

DESCRIPTION OF WORK

Existing facility alarm system shall be expanded to include new panel and equipment as indicated on drawings. Existing sprinkler system shall be connected to new system.

The complete installation shall be done in a neat, workmanlike manner in accordance to the applicable requirements of NFPA 70 - Article 760 and the manufacturer's recommendations.

The New Fire Alarm System shall consist of a single Main Fire Alarm Control Panel (FACP), and (?) Fire Alarm Annunciator Panel (FAAP), unless a different design is submitted and approved.

The New Fire Alarm System shall be configured as a local protective signaling system, as defined in NFPA-72, and shall use/incorporate the following features, as a minimum:

The latest intelligent analog, addressable technology (detectors/sensors and modular panel equipment) currently available from the manufacturer

Non-Coded, Audible Notification Appliances

Initiating Device Circuits (IDCs) shall be limited to short runs from Monitor Modules to the connected device, unless specifically stated otherwise herein, and shall be configured as NFPA Style B (Class B), with individual zone supervision.

Notification Appliance Circuits (NACs) shall be configured as NFPA Style Y (Class "B"). Audible NACs serving Speakers shall be installed using shielded cable, such that the speakers do not generate unwanted noises, due to cross-talk with other circuits.

Data Circuits to Annunciators shall be configured as NFPA Style 4 (Class "B"). All annunciators shall be fully supervised.

The system shall be an intelligent/analog type, and shall consist of the following panels

PANEL NAME:	PANEL TYPE:	PANEL LOCATION:
FACP	Main Fire Alarm Control Unit	Back Door
FAAP	Fire Alarm Annunciator Panel	Front Door
RFCC	Remote Fire Command Center	

REGULATORY REQUIREMENTS
The complete installation shall conform to the applicable sections of the latest edition of the following Codes and Standards:

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA):
NFPA 70 National Electrical Code (NEC) Generally, and Article 760 in particular
NFPA-72 National Fire Alarm Code
NFPA 101 Life Safety Code
IBC International Building Code
IFC International Fire Code
IMC International Mechanical Code

STATE OF WISCONSIN – DEPARTMENT OF SAFETY AND PROFESSIONAL SERVICES (DSPS)

NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION (NEMA)

UNDERWRITERS' LABORATORIES, INC. (UL)
UL-864 Control Units for Fire Protective Signaling Systems
UL-268 Smoke Detector for Fire Protective Signaling Systems
UL-217 Smoke Detectors for Single and Multiple Station
UL-521 Heat Detectors for Fire Protective Signaling Systems
UL-464 Audible Signaling Appliances
UL-1971 Visual Signaling Appliances
UL-38 Manually Actuated Signaling Boxes
UL-1481 Power Supplies for Fire Protective Signaling Systems

MANUFACTURER PROVIDED SERVICES

A manufacturer-trained service technician shall provide the following installation supervision. This Technician shall be certified by the equipment manufacturer, and shall have had a minimum of two years of service experience in the fire alarm industry.

The technician's name shall appear on equipment submittals and a letter of certification from the fire alarm manufacturer shall be sent to the project engineer. The manufacturer's service technician shall be responsible for the following items:

Pre installation visit to the job site to review equipment submittals and verify method by which the system should be wired.

Periodic job site visits to verify installation and wiring of system, and to perform any partial system programming – required to permit portions of the existing system to be removed.

Upon completion of wiring, final connections shall be made under the supervision of this technician, and final checkout and certification of the system.

At the time of final checkout, technician shall give operational instructions to the Owner and/or his representative on the system.

All job site visits shall be dated and documented in writing and signed by the Electrical Contractor. Any discrepancy shall be noted on this document and a copy kept in the system job folder that shall be available to the Project Engineer any time during the project.

QUALITY ASSURANCE

Unless specifically stated otherwise, each and all items of the fire alarm system shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the UL label.

Notification Appliances may be products of a single, different manufacturer – provided that the Primary Equipment Provider or Manufacturer provides written documentation of compatibility, and agrees to assume any and all responsibility for compatibility with the Control Equipment.

In addition to previously listed UL standards, all control equipment shall be listed under the following UL Standards:

UOJZ	UL category UOJZ as a single control unit. Partial listing shall NOT be acceptable.
UL 864	Transient protection
UL 497B	Isolated Loop Circuit Protectors. Where fire alarm circuits leave the building, additional transient protection must be provided for each circuit.
UL 1481	Power Limited Applications.

QUALIFICATIONS
All equipment shall be supplied by a firm, which specializes in fire alarm and smoke detection systems with a minimum of five years-documented experience. The company shall be an authorized distributor of the proposed equipment

All work shall be performed by a licensed contractor, who is regularly engaged in the installation and servicing of fire alarm systems. Proof of five years documented experience and of factory authorization to furnish and install the equipment proposed shall be furnished prior to contract award, if required by WisDOT.

Contractor shall be located within three hours of travel time or less from the site of this project.

SUBMITTALS
Under the provisions of Section 260500 and Division 1, submit the following for approval prior to ordering any equipment in accordance to requirements of Division 1. Submit a total of 10 sets.

Copies of CAD Files (AutoCAD, latest version, or DXF Format) for the Fire Alarm floor plans will be made available to the successful bidder for preparation of the required shop drawings and as-builts

REQUIRED SUBMITTAL MATERIALS
The following items, and any additional items required per Section 260500, shall be included within the submittal package:

Although they may be submitted under separate cover, Submittal Brochures / Booklets / Binders and Shop Drawings shall be submitted together, and shall be treated as a complete set.

COVER SHEET:
The submittals shall contain a cover sheet, which shall include the following information:

Submittal Date
Specification Section(s)
Fire Alarm Contractor (Contact Name, name, address, and telephone number)
Electrical Contractor (Contact Name, name, address, and telephone number)
Project Name, Project City, Project State, and Project Address.

TABS AND TABLE OF CONTENTS:
The Table of Contents shall appear immediately behind the Cover Sheet, and shall contain a complete listing of all of the tabs contained within the binder / booklet.

Tabbed index sheets shall be inserted into each of the binders, such that each binder is clearly sub-divided into sections. Tabbed sections shall be provided, at minimum, for the following:

One section for each building – ALL submittal data, which applies to any particular building, shall be located within the tabbed section for the corresponding building. All submittal data within each "building" section shall appear in the same order.

One section for manufacturer's data sheets – divided into sub-sections for the following:

Panel Equipment (Panels, Panel Components / Modules, Printers, Annunciators, etc.)
Addressable Field Devices (Initiating and Control / Monitoring / Isolation)
Non-Addressable Field Devices (Initiating Devices, relays, etc.)
Notification Appliances
Fire-Fighter Communications Equipment if applicable

EQUIPMENT LIST:
A complete equipment list of all components, including the following: Quantity, Manufacturer, Part Number, and Description. If the supplier uses different part numbers from those of the actual manufacturer, the actual manufacturer and part numbers as they appear – marked on the shipping box / packages, shall also be identified on this list.

Each Equipment List shall include a complete listing of the modules, components, and software included for each modular Fire Alarm Control Panel, Network Panel, Transponder, Outboard Gear Panel or Annunciator. Such items shall be listed in a manner that clearly indicates that such items are parts of / components of a larger unit. Simply stating a single part number and description for such panels shall be unacceptable.

A separate list shall be included for each section, with items grouped by system.

For projects involving multiple systems, separate equipment lists shall be provided - one for each system.

Spare Parts shall also be listed separately, and shall be identified clearly as "Spare Equipment".

PRODUCT DATA:
Manufacturer's product data sheets, and equipment description of all system components. These data sheets shall be highlighted or suitably marked, so that included items and options are indicated. On data sheets that include multiple products, products that are not used shall be crossed out.

Product Data Sheets shall be organized, in order, corresponding to the FIRST occurrence of the corresponding item on the equipment list

SEQUENCE OF OPERATION:
Complete sequence of operations of all functions of the system. This sequence of operation shall be custom-created for this particular job.

In order to satisfy this submittal requirement, it shall be acceptable to include copies of the "Operation" portions of the specifications, including any applicable schedules / other supplementary information. Copied specification pages shall be marked and highlighted, where the programmed operation will differ from the specified operation. Copied specification pages shall be marked "no changes", where no significant deviation will occur. Other acceptable alternatives shall include written narratives, organized in a logical manner, and Matrix Charts.

Where Matrix Charts are provided, such charts shall be organized and labeled clearly, and shall incorporate suitable levels of detail (refer to NFPA-72 (1999) A-7-5-2.2(9) for an example of an acceptable matrix chart). The Leftmost column of the Matrix Chart shall include groupings of initiating devices and other function switches. The Topmost Row shall include groupings of notification appliances and output devices.

BATTERY CALCULATIONS:
These calculations shall clearly illustrate both the Standby and Alarm loads, due to the various field devices and panel components / modules. It is generally recommended to submit such calculations in a "spreadsheet" format. These calculations shall include any reserve / additional capacity, as required elsewhere within these specifications. Final results shall indicate both the minimum battery capacity required and the capacity actually provided.

AMPLIFIER CAPACITY CALCULATIONS
For all speakers plus all required spare capacity.

ADDRESSABLE DEVICE / DESCRIPTOR LIST - Prior to programming the system, submit a chart or printout, listing every system address provided for purposes of alarm initiation, status monitoring, supervised signaling, and auxiliary controls. This printout shall include the corresponding device type and field programmable "custom labels", as they will be displayed on the New System – at the FACP and Local Annunciator. The addresses listed within this document shall directly correspond to the addresses marked on the submitted floor plan drawings. This list will be modified as needed by the Owner and returned to the contractor for final programming in to the system.

NAC WIRE DROP CALCULATIONS:
Calculations shall be provided for all Notification Appliance Circuits (NAC) in the building . It is recommended that this calculation should follow a "spreadsheet" format, and should clearly indicate the following:

The name of the circuit
Point of origin of the circuit
Complete list of all devices served by the circuit, including location and type of each device
Alarm Current Draw for each device, at the applied voltage
Applied Voltage (Based on anticipated battery voltage after specified stand-by & alarm operation)

Acceptable Operating Voltage for each type of device on circuit
Calculated Voltage at each device on circuit

These calculations should mathematically prove that all Notification Appliances on the circuit will receive acceptable power for proper operation, under "worst-case-scenario" conditions.

SHOP DRAWINGS:
All submitted drawings shall be created using CAD, and shall be coordinated so that terminal numbering, circuit designation and equipment or device designations are the same on all drawings. All drawings must be submitted and approved by the engineer before ordering or fabrication starts, but such approval will not waive any specification requirements unless specifically stated. WisDOT shall provide copies of the floor plan drawings, in AutoCAD or DXF format, to the successful bidder.

Each and every sheet of the Shop Drawings shall be clearly and prominently identified as "SHOP DRAWINGS – PREPARED BY: (insert name of contractor firm preparing the shop drawings)", and shall be clearly and visibly different from the Contract Documents / Bidding Drawings. As a minimum, the name and company logo for the Electrical Contractor and the Fire Alarm Equipment Vendor should be added to each sheet, and a revision date shall be inserted on each sheet.

The submitted Shop Drawings shall include the following types of drawings:

PROJECT-SPECIFIC DRAWINGS:
Project-Specific Drawings. These drawings shall include the following:

SYSTEM RISER DRAWING:
A separate riser drawing shall be furnished for each system. Each System Riser shall illustrate all fire alarm circuits, which serve the facility, and shall incorporate the following information, in a clear, concise format:

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 following information for each Field Device:
Device Type
Circuit(s) to which device is connected
Locations of any End-Of-Line Resistor (EOLR)
(and the circuit terminated by any such EOLR)

BLOCK DIAGRAMS:
Showing layout and operation of the entire system.

FLOOR PLANS:
These drawings shall consist of edited versions of the Contract Documents, which shall include the following information:

Fire Department Response Location(s)
Annunciator Location(s)
Panel Location(s)
Device Addresses - The addresses shown on these drawings shall directly correspond to the chart or printout, as specified previously, which spells out specific information about each device, including the field programmable "custom label".

TYPICAL DEVICE / MODULE WIRING DETAILS:
Component and module wiring diagrams – intended to illustrate terminations and wiring connections to each typical Field Device (Detectors, Notification Appliances, etc.), and each typical panel component / module utilized within the system. This set of drawings shall only include diagrams for modules and components, which are actually used in the provided system(s).

These drawings shall incorporate clear labeling / nomenclature, which shall clearly indicate the corresponding field device or module, to which it corresponds.

OMISSION OF ANY OF THE ABOVE MATERIALS FROM THE SUBMITTALS SHALL RESULT IN AN IMMEDIATE REJECTION OF THE SUBMITTALS FOR THIS PROJECT. If the EC / FAC has any questions concerning the preparation of these materials, please contact the Engineer.

DEPARTMENT OF SAFETY AND PROFESSIONAL SERVICES PLAN REVIEW
REQUIRED DOCUMENTS (per building)
This project requires a submittal to the Department of Safety and Professional Services for review and approval. The following details the requirements of the contractor and the A/E with regard to the fire alarm Department of Safety and Professional Services submittal.

CONTRACTOR'S RESPONSIBILITY

a) Department of Safety and Professional Services approval is required prior to the start of fire alarm system construction. The contractor shall prepare and submit the required documents in a timely fashion to meet this requirement. If the contractor starts fire alarm system construction before approval is given by the Department of Safety and Professional Services, the contractor is responsible for all additional fees required by the Department of Safety and Professional Services.
b) Initially, prepare one set of the Department of Safety and Professional Services fire alarm submittals and send it to the A/E for approval before proceeding with actual submittal to DSPS.

c) Contractor shall follow WisDOT's CAD standards when preparing fire alarm shop drawings, using information consistent with the project's construction drawings.

d) After obtaining A/E approval to proceed with the Department of Safety and Professional Services fire alarm submittal, prepare four (4) sets of the fire alarm shop drawings as approved by the A/E that will be sent to the Department of Safety and Professional Services by the contractor. These shop drawings shall be stamped, signed and dated by a Wisconsin registered architect, professional engineer or electrical designer taking responsibility for the shop drawings. Signing and sealing shall comply with SPS 361.31(1). Note that each shop drawing copy must be stamped, signed and dated unless there is a drawing index sheet, in which case only the four index sheets need to be stamped, signed and dated. Where the submitter is both the designer and installer of the fire alarm system, a signature only will suffice [ch. 443.14(6), Stats.]. It shall be an original signature and date.

e) Prepare one bound booklet of the fire alarm system device cut sheets and all calculations (indicating device power calculations, voltage drop calculations and battery calculations). These booklets do not need to be stamped, signed or dated.

f) Prepare a letter of transmittal listing all items being sent to the Department of Safety and Professional Services. Copy the A/E on the letter of transmittal only.

g) Complete the Application for Review, Buildings, HVAC, Fire and Components – SBD-118 form.

h) Calculate the SDB-118 submittal fee; write a check for the appropriate amount, payable to Safety and Professional Services.

i) Request a review date with Department of Safety and Professional Services, Division of Safety and Buildings by emailing the completed first page of the review application, SBD-118, to planschedule@commerce.state.wi.us. or, fax it to 877-840-9172.

j) Assemble the submittal and send the documents described in items (d), (e), (f), (g) and (h) above to the Department of Safety and Professional Services at the appropriate address shown on at the bottom of DBS-118.

k) If requested by WisDOT, A/E, Department of Safety and Professional Services or its authorized representative, additional data pertaining to the construction, materials and equipment shall be submitted to the A/E to substantiate conformance to DSPS 361 code.

PLAN REVIEW FEES

Fees shall be determined in accordance to Table 302.31-1 or Table 302.31-2 found in Chapter SPS 302 of the Wisconsin Administrative Code.

Reduced plan review fees (Table 302.31-2) may be utilized for projects in municipalities that perform inspections as an agent of the Division of Safety & Buildings.

A list of "Delegated Municipalities" that perform inspections can be found at: http://dsps.wi.gov/sb/SB-CommBldgsDeleMunis.html

Reduced fees (Table 302.31-2) do not apply to State-owned buildings.

In addition to the plan review fee, a plan entry fee of $100 shall be included with each submittal.

Per SPS 302.10, plan review fees shall be doubled for projects where the installation, erection or construction was initiated without the required Departmental approval.

WHAT TO SUBMIT

a) Four (4) sets of properly signed/sealed fire alarm plans.

In an effort to limit handling and mailing costs, the submitter may opt to submit one complete set of plans and three index sheets. The plan set will be retained. A copy of the approval letter will be attached to the index sheets and returned. It shall then be the responsibility of the submitter to properly attach the approval and index page to plans matching the copy on file with the Department.

A maximum of five plan sets may be submitted. Additional plan sets (in excess of 5) will incur a $25/set fee.

b) One set of battery calculations.

c) One set of voltage-drop calculations for each notification circuit.

d) One copy of applicable material data sheets.

e) A detailed, project-specific 'Sequence of Operation' which clearly identifies all functions of the fire alarm system, including the transmission of alarm, supervisory and trouble signals to an approved supervising station.

f) A completed SBD-118 application form.

g) The application must identify the Transaction ID No. related to the parent building review approval. Fire alarm submittals for new construction, building additions or building alterations cannot be reviewed prior to building plan approval.

h) The original supervising professional's signature for the building project is applicable to fire alarm submittals and a separate signature is not required. Standalone fire alarm system submittals do not require a supervising professional.

i) Plan review fee.

FORMS

SBD-118 (R11/11) can be downloaded from: http://dsps.wi.gov/sb/docs/sb-Form118App.pdf (PDF) or http://dsps.wi.gov/sb/docs/SB-Form118App.doc (Word)

Visit Department of Safety and Professional Services, Division of Safety and Buildings Commercial Buildings Plan Review info website for additional information: http://dsps.wi.gov/sb/SB-HomePage.html.

For scheduling of building, HVAC, and fire plans, use the electronic online request for commercial building plan appointments: http://dsps.wi.gov/sb/SB-DivPlanReview.html

Once approved, Safety and Buildings will retain one of the sets, and will return three sets, which shall be distributed as follows:

(1) copy shall be retained by the fire alarm contractor on-site, and shall be used as a reference / made available to any Department of Safety and Professional Services inspectors, who may make periodic inspection visits to the site.

(1) copy shall be forwarded to the Owner for their records.

(1) copy shall be retained by the Division 26 electrical contractor, for their records. If the Division 26 electrical contractor and the fire alarm contractor are the same firm, this copy shall be kept on site, at or near to the Fire Alarm Control Panel.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR SCHEDULING, COORDINATING, AND ATTENDING THIS INSPECTION, AND FOR PAYMENT OF ALL ASSOCIATED INSPECTION / PERMIT FEES.

This process normally involves both a plan review and inspections; however, for State-Owned Buildings, the City of Edgerton only performs the inspections, with the Plan Review being performed by COMM / Safety & Buildings as specified previously under "Submittals".

Because of this Permit / Inspection process, the following procedure shall be followed by the Division 26 Electrical Contractor, (and by their sub-contractors, where particular arrangements have been made between the EC and their sub-contractor(s)):

First, the Electrical Contractor shall obtain State-Approval of the Installation Drawings, per the process previously described under "Submittals – Plan Review Process", as found within this specification.

Once the State-Approved Drawings are received by the contractor, and PRIOR TO STARTING ANY CONSTRUCTION, the Electrical Contractor shall completely fill-out submit the proper "City of Edgerton Fire Department – Fire Protection System Work Permit Application" form. If required, suitable fee payment shall accompany the form. Copies of this form may be obtained via the following link:

Once the form has been received, processed, and accepted by the Edgerton Fire Department will issue the proper permit, and construction may begin.

The inspection program involves at least two inspections, as follows:

A Rough-In Inspection shall be scheduled and performed, prior to installation of any new devices. In certain buildings (high-rises), multiple rough-in inspections may be required, as subsequent areas are completed. It is highly recommended that these inspections should be carefully scheduled and adhered to, since potentially costly mistakes can be prevented before the associated devices are completely installed.

Final Inspection of the System – prior to this inspection, the Electrical Contractor shall have conducted all necessary pre-testing.

PROJECT RECORD DRAWINGS

Installing Electrical Contractor shall submit to the WisDOT Construction Superintendent the as-built drawings for the entire work done under this project prior to final payment.

Work shall be done on Auto CAD using the contract drawings provided to the Contractor by WisDOT in the form of Auto CAD files. A hard copy of same shall also be submitted.

These drawings shall show:
Locations and addresses of Initiation Devices, Notification Appliances, isolation devices, status-monitoring devices, supervised signaling devices, and auxiliary control devices.
Circuit and Address information for each field device listed above.
Conduit layout and size
Number/size/type of conductors in each conduit run
Riser diagrams
Location of end-of-line devices

Riser diagrams shall include location of emergency 120VAC panel, panel designation and circuit number used to feed each fire alarm panel. Also, indicate if panel is backed up by an emergency generator.

Riser diagrams shall include locations (room or area number) of notification, initiating, end-of-line devices and addresses for all addressable field devices.

Also see requirements in Division 1.

OPERATION AND MAINTENANCE DATA

All operations and maintenance data shall comply with the submission and content requirements specified under Division 1.

In addition to the general content specified under Division 1 supply the following additional documentation:

1. A material guide, which shall contain the replacement part numbers and description of all components used. If this information is included in an instruction section for any of the equipment, it will not be necessary to duplicate the list. In either case, the parts list shall be associated with its respective chassis, modules or kit wherein it is found. A total listing of parts without such grouping will not be acceptable.

2. Catalog data or literature.
3. Manufacturer's operating instructions.
4. Manufacturer's maintenance instructions.
5. Installation instructions.
6. Name, address and telephone number of source for parts (i.e. keys, guards, etc) not supplied by the Fire Alarm Manufacturer.
7. Copies of all approved shop drawings.
8. An updated copy of the submitted sequence of operation, revised to reflect any implemented changes.

PRODUCT DELIVERY, STORAGE AND HANDLING
Receive equipment at job site; verify applicable components and quantity delivered.

Handle equipment to prevent internal components' damage and breakage, as well as denting and scoring of enclosure finish.

Do not install damaged equipment.

Store equipment in a clean, dry space and protect from dirt, fumes, water, and construction debris and physical damage. Make arrangements with the Owner at the pre-construction meeting for storage of equipment on the premises

SPARE PARTS
Contractor shall provide the following spare parts in quantities shown:

Quantity:	Type of Device
(1)	Wall mounted multi-candela Speaker/strobe Units
(1)	Pull Stations

SUPERVISION
The system shall report a TROUBLE condition when any supervised circuit becomes disarranged, disconnected, or is manually disabled or overridden. Each supervised circuit shall be independently protected for short-circuit conditions, and shall be arranged so that faults on any one circuit do not prevent the proper operation of any other circuit in the system.

The following devices/circuits shall be supervised, as a minimum:
ALL communications links.
ALL Signaling Line Circuits
ALL Initiating Device Circuits.
All sprinkler flow and tamper switches..
ALL Notification Appliance Circuits.
Auxiliary manual control circuits.

Remote Control Relays / Control Modules.
Primary, AC Incoming power to the system.
The system's batteries.
System Expansion Modules
Auxiliary module LED's.

The system shall have provisions for disabling and enabling all circuits individually for maintenance or testing purposes.

Each independently supervised circuit shall include a discrete LCD readout, to indicate disarrangement conditions per circuit.

POWER REQUIREMENTS
Primary 120 VAC power, to all Fire Alarm equipment shall consist of dedicated branch circuits. These circuits shall be of a 3-conductor type, including a suitably sized green ground wire – SHARED NEUTRALS AND CONDUIT GROUNDS SHALL BE UNACCEPTABLE.

Each control panel shall receive 120 VAC power via a branch circuit in one of the building's emergency load panels. Each such branch circuit shall have a "breaker lock" to prevent accidentally de-energizing of the power to the fire alarm panel. Circuit breakers shall be painted red and labeled "FIRE ALARM". If more than one power circuit is used, each circuit shall be properly labeled as “FIRE ALARM”, and shall also be labeled with additional information – in order to indicate which fire alarm equipment is powered from each such circuit.

All fire alarm power supplies, as well as any other supplemental power supplies, shall be installed in compliance with NFPA-70 – National Electrical Code (Latest Edition).

The panel shall include a disconnect switch for the AC power inside a locked enclosure near the panel or within the panel itself. This switch shall be labeled “Fire Alarm Power Disconnect”.

Where the new control panel is to remain at same location as the existing panel, the contractor may re-use the existing branch circuit, if it meets the previously stated requirements stated above.

The control panel shall include 120 VAC electrical power surge and transient protection. If problems are anticipated, due to electrical transients associated with periodic generator testing, then the fire alarm equipment supplier shall provide suitable power filtering / suppression equipment, as recommended by the equipment manufacturer.

The system shall include sufficient back-up battery capacity to operate the entire system as follows, upon loss of normal 120 VAC power:

For panels, which are not connected to Dedicated Emergency Power (no Generator) Branch Circuits:

The Panel and associated devices shall operate in a normal (non-Alarm) mode for a period of 24 Hours. After the 24-Hour normal period has expired, sufficient capacity shall remain, such that the panel and associated devices shall operate in an Alarm mode (All Speakers EVAC) for a period of 10 minutes.

The panel shall include a power-limited, filtered and regulated battery charger. The charger shall charge a fully discharged battery to 70% in 12 hours. The panel shall monitor for AC fail / disconnect, low/no battery and high battery and shall distinctly display or annunciator any abnormality. The main panel power supply shall include sufficient power to power all connected field devices and an additional 25% spare power for future additions without the need to add additional boards or booster power supplies. The charger shall be designed specifically for, or shall be properly configured for the provided batteries, which shall be of one of the following types:

Sealed, Immobilized Electrolyte Lead-Acid type ("Gel-Cells") – Types which require fluid level maintenance, or which vent significant amounts of Hydrogen shall be unacceptable.
Nickel-Cadmium (Ni-Cad) batteries.

All batteries used in conjunction with the fire alarm system shall be installed in accordance to NFPA-70 – National Electrical Code (Latest Edition).

If these batteries are not located within or immediately adjacent to the fire alarm equipment, the location of such batteries shall be clearly indicated within the fire alarm equipment served by them, and the batteries and their enclosure shall be clearly marked as "FIRE ALARM"

All external circuits requiring system-operating power shall be 24VDC and shall be individually supervised and fused at the control panel.

PART 2 - PRODUCTS

ENCLOSURES

All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component.

Cabinet shall be equipped with locks and transparent door panel providing tamper proof enclosure yet allowing full view of the various lights and controls as required above.

MULTIPLEX/INTELLIGENT FIRE ALARM CONTROL PANEL (FACP):

A Multiplex intelligent fire alarm system shall be installed within the building. This building shall be provided with a minimum of one Fire Alarm Control Panel (FACP), as shown on the project drawings.

The fire alarm system shall allow for loading and editing special instructions and operating sequences as required. Software programming shall allow for full flexibility for selective input/output control functions based on the Boolean programming functions AND, OR, NOT, as well as, timing, and special coded operations. The system shall be able to use all of the above programming functions in combination with any number of inputs and outputs. The systems shall be capable of on-site programming to accommodate system expansion and facilitate changes in operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory.

Simple Addressable systems, which do not support Analog Addressable or Intelligent Addressable detection technology shall also be unacceptable.

The control panel shall provide the following as standards:
Analog Addressable or Intelligent Addressable Detection, supporting the following:

- Drift compensation
- Sensitivity display in %
- Sensitivity adjustment
- Day/night sensitivity adjustment
- Auto Detector test to meet NFPA 72
- Alarm verification with tally counter
- Maintenance alerts

The number of Signaling Line Circuits (SLCs) required for the specified quantity of addressable field devices and peripherals, plus one (1) spare loop (SLC) for each five (5) active loops. Each active loop shall include 10% spare capacity or a minimum of 10 additional devices.

The number of Audible Notification Appliance Circuits (Speaker NACs) required for the specified quantity of speakers plus one (1) spare circuit for each ten (10) active circuits. Each active circuit shall include 25% spare capacity

The number of Visual Notification Appliance Circuits (Strobe NACs) required for the specified quantity of strobes plus one (1) spare circuit for each ten (10) active circuits. Each active circuit shall include 25% spare capacity or a minimum of (4) 110 cd devices that can be added in the future.

- 80-character liquid crystal display.
- Printer interface
- History log file with a minimum of 800 events
- Field programmability
- Silent walk test

The multiplex/intelligent system shall provide the ability to recall alarms and trouble conditions in chronological order for the purpose of recreating an event history.

The LCD shall display the following information relative to the abnormal condition of a point in the system prior to acknowledgement:

40 characters for:

Point address and loop number (i.e. 555-L5)
Type of device (i.e. smoke sensor, pull station, water-flow)
Point status (i.e. alarm, trouble)

40 characters for:

Custom location label (i.e. 4th Floor - Room 444)

Keyboards or keypads shall not be required to operate the system during fire alarm conditions.

The following software functions shall be provided, from the built-in system keyboard / display:

Setting of time and date
LED testing
Alarm, trouble, and abnormal condition listing
Enabling and disabling of each monitor point separately
Activation and deactivation of each control point separately
Changing operator access levels
Walk Test enable / disable
Running diagnostic functions
Displaying historical logs
Point listing

The following hardware switches/functions shall be provided within the main panel enclosure:

Acknowledge alarm or trouble
Silence alarm or trouble
Reset system after alarm
Connect/disconnect Central Monitoring tie
Bypass AHU / Fan Interface

Switches not applicable to this building shall still be provided in the stated quantity along with (2) additional switches for future expansion. These additional switches as well as any switches not utilized would not be initially programmed and would be label unused

STATUS INDICATORS AND DISPLAYS
A local audible device shall sound during Alarm, Trouble or Supervisory conditions. This audible device shall also sound during each key-press to provide an audible feedback to ensure that the key has been pressed properly.

The 2-line by 40-character liquid crystal display shall be backlit for enhanced readability.

A cursor shall be visible on the LCD when entering information.

Scrolling through menu options or lists shall be accomplished in a self-directing manner in which prompting messages shall direct the user

CONTROLS

The following controls shall be accessible with the front door open.

Manual evacuation (drill)
EVAC Microphone, and associated Audio Controls and Indicators
LED / LCD Test Switch
Key pad for data input and microprocessor control
Bypass Function Switches and LEDs for the following. Mark unused future if not applicable:
Central Monitoring Bypass
HVAC / Fan Interface bypass
Future Programmable Switch #1
Future Programmable Switch #2

LED SUPERVISION
All slave modules LEDs shall be supervised for burnout or disarrangement

ACKNOWLEDGMENT
Two methods of acknowledgment for each abnormal condition shall be provided. One may be chosen depending on the NFPA requirements.

First method - Acknowledge one event at a time from an unacknowledged list of events:

Pressing the appropriate acknowledge button shall display the first unacknowledged condition in the appropriate list (either alarm, supervisory or trouble), and require another acknowledge button. Press to acknowledge only the displayed point.

After all points have been acknowledged, the LEDs shall glow steadily and the Sonalert will be silenced. The total number of alarms, supervisory and trouble conditions shall be displayed along with a prompt to review each list chronologically. The end of the list shall be indicated by an end of list message "END of LIST".

Second method- Pressing the appropriate acknowledge button shall globally acknowledge all points.

SILENCING
If an alarm condition exists and the "Alarm Silence" button is pressed, all alarm audio and visual notifications appliances shall cease operation.

If trouble conditions exist in the system and the "Trouble Silence" button has been pressed, the aural trouble signal shall cease, but shall resound at time intervals to act as a reminder that the fire alarm system is not in a normal operating mode. Both the time interval and the trouble reminder signal shall be programmable to suit the Owner's application.

RESET
The SYSTEM RESET button shall be used to return the system to its normal state after an alarm condition has been remedied.

Should the Alarm Silence Inhibit function be active, the system shall ignore all key presses. An indication of enabling and disabling the inhibit state shall be provided as a feedback to the operator.

BYPASS FUNCTIONS
Provide a switch for each item as shown below. Switches not applicable to this building would be provided, but left non programmed and labeled and unused.

Bypass Switches shall be configured such that whenever any bypass function is active, a Trouble status condition shall be reported by the system, per the Trouble Sequence. The trouble message shall indicate the active function(s). Bypass LEDs shall be configured such that LEDs corresponding to the active function(s) shall illuminate, and shall remain lit until the associated bypass function is de-activated (until the system is restored to normal operating status). Switches and LEDs shall be provided for the following functions:

Central Monitoring Bypass - When this bypass function is active; reporting of various status conditions to the reporting system shall be disabled.

HVAC / Fan Interface bypass - When this bypass function is active; actuation of the Control Modules or Supervised Relays, which interface to the AHU / Fan starters / Temperature Controls, and to any Smoke Dampers shall be prevented. (Smoke Control System bypass shall be accomplished via the separate, previously specified manual controls).

ACCESS TO OPERATOR FUNCTIONS:
The following Operator Function Access Restrictions shall be adhered to as closely as possible. Where system limitations do not allow for the restrictions to be configured exactly as listed, alternate methods will be considered, and shall be brought to the attention of the Engineer prior to bidding:

ACCESS LEVEL 1 - BASIC OPERATOR FUNCTIONS:

ACKNOWLEDGE – allows Basic Operators to acknowledge ALARM, TROUBLE, and SUPERVISORY conditions, and to view the lists / logs associated with these functions.

SIGNAL SILENCE – allows Basic Operators to silence the audible and visual signals. The system shall not permit signals to be silenced during “alarm silence inhibit mode” (if “Inhibit Mode” is utilized).

SYSTEM RESET – allows Basic Operators to Reset the Fire Alarm System. The "System Reset" button shall be used to return the system to its normal state after an alarm condition has been remedied. The LCD display shall step the user through the reset process with simple English language messages.

POINT LISTING

All points list by address
Monitor point list
Signal/speaker list
Auxiliary control list
Feedback point list

HISTORY LOGGING

The system shall be capable of logging and storing the last 800 events (alarm & trouble) in a history log. These events shall be stored in a battery protected random access memory.

The following historical alarm/trouble log events shall be stored:

Alarms
Alarm Acknowledgment
Alarm Silence
System Reset
Alarm Historical log cleared
Trouble conditions
Supervisory alarms
Trouble acknowledgment
Supervisory acknowledgment
Alarm Verification tallies
Walk Test results
Trouble Historical log cleared

SILENT WALK TEST WITH HISTORY LOGGING

The system shall be capable of being tested by one person. While in testing mode the alarm activation of an alarm-initiating device shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after the logging of the alarm.

The momentary disconnection of an initiating or indicating device circuit shall be silently logged as a trouble condition in the historical data file. The panel shall automatically reset itself after logging of the trouble condition.

Should the silent walk-test feature be on for an inappropriate amount of time (30 minutes max.) it shall revert to the normal mode automatically.

The panel shall have the capability of dividing the system into distinctive walk test groups, a minimum of 8 groups.

Should an alarm condition occur from an active point, not in walk test mode, it shall perform operations described above.

After testing is considered complete, testing data may be retrieved from the system in chronological order to ensure device/circuit activation.

FIELD PROGRAMMING

The system shall be fully programmable, configurable, and expandable in the field without the need for special tools or PROM programmers and shall not require replacement of memory IC's. All programming may be accomplished through the standard control panel keyboard or a keyboard at the printer, or the use of a PC. All programs shall be stored in non-volatile memory.

All programming or reprogramming shall be done by the supplier at no charge until the owner accepts the system.

SOFTWARE MODIFICATIONS

The system shall be capable of being programmed by means of a Field Configuration Program (FCP) allowing programming to be downloaded via portable computer from any node on the network.

Provide the services of a factory trained and authorized Technician to perform all system software modifications, upgrades, or changes. Response time of the Technician to the site shall not exceed 4 hours.

Should the Owner have a factory trained and authorized technician on staff, provide all hardware, software, programming tools, access codes, and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones, and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site. Modification of software shall not require power-down of the system or loss of system fire protection while modifications are being made.

If the system access code is either a hardware key or a software key, the Contractor/Vendor shall provide the proper key to meet the above requirements."

Each RS-232-C port shall be capable of being configured for either a CRT or a printer.
One such port shall be configured for a supervised connection to the Fire Alarm System printer.
One such port shall be configured for non-supervised connection to the CRT or Laptop.

SIGNALING LINE CIRCUITS:
The system must provide communications with intelligent addressable initiating and control devices individually. These devices shall be individually annunciated at the control panel and FAAP and RFCC. Annunciation shall include the following conditions for each point:

Alarm
Trouble
Open
Short
Device missing/failed

All intelligent addressable initiation and control devices shall have the capability of being disabled or enabled individually.

Systems that require factory pre-programming or EPROMs to add or delete devices shall be unacceptable.

The communication format must be a completely digital poll/response protocol to allow t-tapping of the Signaling Line Circuit wiring. Systems that do not utilize full digital transmission protocol are not acceptable.

Special-purpose Isolator devices shall be used to provide further isolation / protection of sections of the Signaling Line Circuits. Areas served by Signaling Line Circuits shall be isolated as specified within the “scope” portion of this specification. The following Isolation devices shall be acceptable for use in performing this function:
Isolator Modules – Field Mounted.

OPERATION: MULTIPLEX/INTELLIGENT FIRE ALARM SYSTEM

PRIORITY:
Fire Alarm status conditions shall have the highest priority.

Supervisory status conditions shall have the second highest priority.

Trouble status conditions shall have the lowest priority.

STAND-BY MODE:
Under normal condition the front panel shall display a "System is Normal" message and the current time and date

SYSTEM RESPONSE
The time delay between the Alarm activation of an initiating device, and the automatic activation of the Notification Appliances and the annunciation of the Alarm status condition at the FACP and annunciators shall not exceed 5 seconds.

For response-time purposes, the manual actuation of an Audio Control Switch - associated with the one-way voice communications system - shall be instantaneous and shall be treated as if it were manual alarm activation.

ALARM SEQUENCE:
The following events are not required to occur in the stated order. However, ALL automatic responses must be initiated within the time interval allotted by UL and NFPA codes and standards.

This "Fire Alarm Sequence" shall be initiated upon receipt of one of the following, valid Fire Alarm status conditions:

> Actuation of any Manual Pull Station, any Fire Protective Sprinkler System, any other Automatic Fire Suppression System, from any Smoke Detector, any addressable Heat Detector, any beam-type Smoke Detectors, any non-addressable Heat Detector

The system alarm operation, subsequent to the activation of any of the conditions listed above, shall be as follows:

> The EVAC System shall automatically initiate "EVAC" Mode. All audible notification appliances (Speakers) within the building shall sound, using a sequence that is compliant with NFPA-72 – including an Alert Tone and a Digital Voice Message. The Alert Tone and Digital Message shall be repeated a minimum of three times, and shall continue to be repeated until the Audible Notification Appliances are Silenced, until a Manual Announcement is Made, or until the system is Reset.

All visual notification appliances within the building shall flash continuously until the system is reset.

Any subsequent alarm shall reactivate the alarm audible and visual notification appliances within the building.

Alarm outputs connected to the facility reporting system shall be activated.

The system Alarm LED shall flash on the FACP and the FAAP, until the alarm has been acknowledged. Once acknowledged, this same LED shall latch on.

A subsequent alarm received from another device shall flash the system alarm LED on the FACP and the FAAP. The LCD display shall show the new alarm information.

A pulsing alarm tone shall occur within the FACP and the FAAP until the event has been acknowledged.

The system shall have a single key that will allow the operator to display all alarms, troubles, and supervisory service conditions including the time and date of each occurrence.

A programmed Alarm Message shall appear on the FACP and the FAAP LCD displays. These field programmable messages shall be revised, as directed by the Owner, during shop drawing review. The alarm shall be displayed on an 80-character LCD display as follows:
40 characters for:

- Point address and loop number
- Type of device
- Point status

40 characters for:

- Custom location label

AUTOMATIC ALARM VERIFICATION:
The initial Alarm activation of any system smoke detector shall initiate an alarm verification operation whereby the panel will reset the activated detector and wait for a second alarm activation. If, after (20) seconds and within (30) seconds after resetting, a second alarm is reported from the same or any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within (30) seconds, the system shall resume normal operation. The alarm verification shall operate only on single smoke detector alarm. Other activated initiating devices or multiple smoke detector alarms shall be processed and reported immediately.

The alarm verification operation shall be selectable by device or by group for addressable detectors and by IDC for non-addressable smoke detectors. Automatic Alarm Verification shall be enabled for all smoke detectors.

SELF-TEST AND AUTOMATIC DRIFT COMPENSATION:
The control panel shall continuously perform an automatic self-test routine on each Smoke Detector, which will functionally check detector electronics and ensure the accuracy of the values being transmitted to the control panel. Any detector that fails this test shall indicate a "SELF TEST FAILED" trouble condition with the detector location at the control panel.

All Intelligent Addressable Smoke Detectors used on this project shall incorporate automatic drift compensation / automatic sensitivity monitoring and adjustment, as described within the “definitions” portion of this specification section.

OPERATOR INTERFACE / MAINTENANCE FEATURES FOR AUTOMATIC SMOKE DETECTION:

An operator at the control panel shall have the capability to manually access the following information for each detector:

Primary status
Device type
Present average value
Present sensitivity value selected
Peak detection values
Detector range (normal, dirty, etc.)

Values shall be in "percent of smoke obscuration" format so that no interpretation is required by the operator.

An operator at the control panel shall have the capability to manually control the following for each detector:

Clear peak detection values
Enable or disable the detector
Clear verification tally
Establish alarm sensitivity
Control a detector's relay driver output

It shall be possible to program the control panel to automatically change the sensitivity settings of each detector based on time-of-day and day-of-week.

The control panel shall clear a “Detector dirty” trouble after a detector has been removed from its base cleaned and replaced.

AHU SYSTEM INTERFACE

Duct Smoke Detectors and Addressable Control Modules, or Supervised Remote Relays shall be provided as specified below. Duct Smoke Detectors shall be installed in compliance with the manufacturer’s recommendations. Each Addressable Control Module or Supervised Remote Relay for AHU and / or Fan shutdown shall be installed within 3 feet of the Temperature Control Panel to which it is connected. The Division 26 EC shall provide all wiring and terminations required for shutdown of the specified AHUs / Fans.

The Addressable Control Modules or Supervised Remote Relays provided for this purpose shall be provided with DPDT output contacts. One SPDT set of the DPDT contacts shall be utilized for the specified shutdown function. The second SPDT set of the DPDT contacts shall be available for connection to the temperature controls, to indicate that unit shutdown – due to Duct Smoke – has occurred.

The control panel shall provide an output alarm interface to the air handling/energy management system controllers, which in turns shall perform automatic function as specified in the applicable sections of Division 23.

An override feature / control switch shall be provided which shall prevent shutdown of AHUs when this function is active.

On this project, Air Handling Equipment Interface shall be configured as follows:

PROGRAMMING:
All such AHUs / Fans shall shut down on any ALARM and remain shut down, until a valid System Reset occurs.

SPRINKLER SYSTEM SUPERVISORY SERVICE
The control panel shall have a dedicated supervisory service LED and a dedicated supervisory service acknowledge switch.

The activation of any standpipe or sprinkler valve supervisory (tamper) switch shall activate the system supervisory service audible signal and illuminate the LED at the control panel and FAAP. The panel shall provide differentiation between valve tamper activation and opens and/or grounds on the initiation circuit wiring.

The Fire Pump shall be monitor for presence of power, lose of power and phase reversal

Pressing the supervisory service acknowledge key will silence the supervisory audible signal while maintaining the supervisory service LED "on" indicating the off-normal condition.

Restoring the valve to the normal position shall automatically reset the tamper indication.

TROUBLE SEQUENCE:
Disarrangement, disconnection, Power Failure, or malfunction of any supervised feature(s) / components of the System shall cause actuation of the following sequence of events:

A SYSTEM TROUBLE or POINT TROUBLE status condition shall be both audibly and visually indicated at the Fire Alarm Control Panel (FACP) and FAAP in a way which differentiates the TROUBLE status clearly from an ALARM. Audible indication shall cease, once the TROUBLE has been acknowledged.

In addition, a programmed message, similar in nature to the ALARM “Custom Labels”, shall appear on the FACP and FAAP. (Default messages, if TROUBLE Detector / Sensor / Module Point Messages are associated with ALARM messages, shall be acceptable.)

The Trouble status condition shall also be Visually and Audibly indicated at all appropriate Network Annunciators and at the Fire Alarm Network Computer. This indication shall be essentially identical to the Audible, Visual, and Alphanumeric display at the FACP and FAAP except that additional information shall be incorporated, to indicate the building of origin.

A “Trouble Reminder” Feature, which causes the FACP to re-sound the TROUBLE indicators when System / Point TROUBLE conditions remain on the system, shall be enabled, and shall be set to re-sound every twelve (12) hours.

Subsequent Troubles shall cause the FACP and FAAP TROUBLE LEDs and sounders to re-sound, along with the “Custom Label” and other information related to the “new” TROUBLE condition.

MANUAL DRILL
A manual evacuation (drill) switch shall be provided to operate the alarm indicating appliances without causing other control circuits to be activated.

LED AND LCD TEST
Activation of the Lamp Test switch shall turn on all LED indicators, LCD display, and the local sounder and then return to the previous condition.

SYSTEM DIAGNOSIS
The system shall include special software to detect, diagnose and report failures and isolate such failures to a printed circuit board level.

SILENT WALK TEST WITH HISTORY LOGGING
The actuation of the "Walk Test" switch/program at the control panel shall activate the "Walk Test" mode of the system, which shall cause the following to occur:

The Output Contacts, which provide the interface to the Fire Alarm System Reporting shall be bypassed.
Control relay functions shall be bypassed, such as door holders, elevator capture, fan shut down, etc.
The audio and visual circuits shall be bypassed.
The control panel shall show a trouble condition.
The alarm activation of any initiation device shall be silently logged as an alarm condition in the historical data file. The panel shall automatically reset itself after the logging of the alarm.
Any momentary opening of an initiating or indicating appliance circuit shall be silently logged as a trouble condition in the historical data file.
The panel shall automatically reset itself after logging of the trouble condition.
If the system becomes inactive for a period of longer than 10 minutes the panel shall default to normal fire alarm functions.

The panel shall be programmed to consist of a minimum of (1) distinctive walk test groups as follows:

It shall not be required to manually restart or reboot the fire alarm panel after a silent walk test is completed.

CENTRAL MONITORING
The new Fire Alarm System shall be interfaced to the following systems utilizing new copper, connection, for remote reporting of the various conditions listed below:
To an offsite commercial supervising station. See below for required relay outputs

The interface between the reporting system(s) listed above and the new Fire Alarm System shall be configured as follows:

Required relay (contact) outputs:
Fire Alarm: This contact shall actuate in response to any Fire Alarm status condition, other than Sprinkler Water Flow.

Water Flow Alarm: This contact shall actuate only in response to Fire Alarm status Conditions, which are due to Sprinkler Water Flow.

Sprinkler Supervisory: This contact shall actuate in response to actuation of any Valve Tamper Switch associated with the Fire Protective Sprinkler System.

System Trouble: This contact shall actuate in response to the occurrence of any Trouble status condition on the Fire Alarm System.

The Contractor installing the new Fire Alarm Systems shall be responsible for coordination of the Fire Alarm System connections to these system(s), for all wiring and conduit between these system(s), and for all terminations at the Fire Alarm end of such interface wiring. All such wiring, raceway, and terminations shall be included per the Base Bid.

TONES FOR ONE-WAY EMERGENCY VOICE SUB-SYSTEM:
The Alert Tone and Digital Voice Message utilized by Automatic Mode shall be compliant with the latest NFPA-72. The Tone and Message shall be selected by the Owner and Engineer.

The Main Alert tone shall be the temporal code pattern. This temporal pattern shall be compliant with the latest ANSI standards, currently S3.41, and as described in the latest NFPA-72.

EVACUATION - AUTOMATIC MODE:
In most cases, the One-Way Voice Communications sub-system shall function automatically as a tone generator and Digital Message Generator. Whenever Automatic EVAC Mode is triggered, the system shall function according to the system programming. The Fire Alarm System shall be programmed such that this Mode shall ALWAYS be accompanied by simultaneous operation of ALL Visible Notification Appliance Circuits, within the active Notification Areas.

The actual sequence, signal tone, and digital voice message utilized by Automatic Mode shall be compliant with the latest edition of NFPA-72. Currently it is 3-12.6.3.1(a) (1996 Edition), and the tone and message shall be repeated automatically, until one of the following occurs:

Until the Audible Notification Appliances are Manually Silenced.
Until the Fire Alarm System is Reset.

The sequence shall include a back-up tone generator, which operates in compliance with the latest edition of NFPA-72. Currently it is 3-12.6.3.2 (1996 Edition) in the event of failure of the primary tone / message generator.

Pressing the "Signal Silence" switch, at either the FACP shall cause the audible Notification Appliances to cease operation.

All Visual Notification Appliances shall continue to flash until the system is reset.

REMOTE ANNUNCIATOR
Where shown on the plans, provide and install Annunciator FAAP.

Each panel shall incorporate an Alphanumeric LCD Annunciator, which shall functionally duplicate the FACP display, as well as standard controls for Acknowledge, Silence, and Reset.

ANNUNCIATION FEATURES
The Annunciator portion of each panel shall consist of the standard, compact-size LCD Alphanumeric Annunciator, as manufactured by the Fire Alarm System Manufacturer. This unit shall mimic the display assembly of the FACP, and shall incorporate the following features:

LCD Display
Multi-function, integrated sounder – duplicates the FACP sounder
LEDs for:
Power (Green)
Fire Alarm (Red)

Secured Switches (Secured under keyed door, or enabled via key switch) for:

Acknowledge
Signal Silence
System Reset

GENERAL REQUIREMENTS
FAAP shall incorporate the following features:
Mar-resistant painted enamel or a stainless steel finish.

FAAP Panel shall communicate with the Fire Alarm Control Panel by means of a supervised serial data link, as well as any required audio buss connections. The operating power shall be 24VDC and shall be fused at the control panel. LED annunciators and point-wired (non-serial) annunciators are not considered equal and shall be unacceptable.

All wiring between the FAAP panel and the fire alarm control panel shall be supervised for opens, grounds and shorts.

Under normal operating conditions, the LCD display shall indicate the time, date and "SYSTEM IS NORMAL" label.

During abnormal conditions, the LCD shall operate in the same manner as the FACP LCD Display.

MULTIPLEX/INTELLIGENT PERIPHERAL DEVICES
All devices shall be supervised for trouble conditions. The system control panel shall be capable of displaying the type of trouble condition (open, short, device missing/failed). Failure of a device shall not hinder the operation of other system devices.

DEVICE IDENTIFICATION
Each intelligent device must be uniquely identified by an address code entered on each device at time of installation. The use of jumpers to set address shall not be acceptable.

Device addressing schemes which use permanently-imbedded, electronically-identifiable “serial number” which is similar to the address imbedded within Personal Computer Network Interface Cards shall be acceptable.

Fire Alarm Systems utilizing hand-held or briefcase-style programming tools. Which are used to electronically assign addresses and/or programming parameters to devices shall be acceptable. However one such programmer tool shall be provided to the Owner at no additional cost.

The address along with the loop number and end-of-line device if present shall be indicated, and be visible from the ground, on the device in the field using machine generated marking. Contractor shall provide a sample of such labeling scheme before using it.

End-of Line devices shall also be identified by means of permanent, machine generated label, affixed to the device.

Device identification schemes that do not use uniquely set addresses but rely on electrical position along the communication channel are unacceptable. These systems cannot accommodate t tapping and the addition of an intelligent device between existing devices requires re-programming all existing devices beyond added device.

The system must verify that proper type device is in place and matches the desired software configuration.

INTELLIGENT DETECTORS - GENERAL
Smoke and heat detectors must be approved by the State Engineer prior to installation.

Each detector shall incorporate the following features:
LED(s), which shall flash to indicate communication with the Fire Alarm System, and which also illuminate in a steady manner when the detector is in an alarm status.
A means to allow field function testing of the detector.
A low-profile design / shape.
An insect screen.
Voltage and RF transient suppression techniques, in order to minimize false alarms.

Smoke detectors shall communicate the actual smoke chamber values to the system control panel.

Smoke detectors shall be listed for sensitivity testing from the control panel. Sensitivity test results shall be logged and downloaded to a printer.

The detectors shall be plug-in units, which mount to a common base, and shall be UL 268 approved.

Each detector shall be compatible with the fire alarm panel and shall obtain its operating power from the SLC, to which it is connected. (Where relay or sounder-equipped bases are used, it shall be acceptable to require a separate 24 VDC or NAC connection.) Each detector shall be reset by actuating the control panel reset switch.

If field conditions so require the smoke detection devices shall not be installed until the construction is completed.

INTELLIGENT DETECTOR BASES
Bases shall be suitable for either smoke or heat detector mounting.

Either the base or the head shall contain electronic circuits that communicate the detector's status (normal, alarm, sensitivity status, trouble, etc.) to the control panel over two wires. The same two wires shall also provide power to the base and detector. Contacts between the base and head shall be of the bifurcated type using spring-type, self-wiping contacts.

The base shall be lockable. The locking feature must be field-removable when not required.

Upon removal of the detector's head, a trouble signal shall be transmitted to the control panel.

The detector base shall be sealed against rear airflow entry.

Each detector's base or head shall contain LED(s), which shall flash when the detector is being scanned by the control panel. The LED(s) shall turn on steady when the detector is in an alarm condition.

INTELLIGENT PHOTOELECTRIC SMOKE DETECTORS
The detectors shall contain no radioactive material.

Detectors shall be of the solid state photoelectric type and shall operate on the light scattering photodiode principle using a pulsed infrared LED light.

INTELLIGENT DUCT SMOKE DETECTORS
Duct detectors shall be of the photoelectric type specified above. It shall be possible to alarm the duct detector by using a remote or local test switch.

For maintenance purposes, it shall be possible to clean the duct housing sampling tubes by accessing them through the duct housings front cover.

Detector shall include remote keyed test switch and alarm LED indicator.

In mechanical rooms, alarm LED indicators for duct detectors shall be grouped on a stainless steel cover plate mounted adjacent to the main mechanical room door. Each LED shall be labeled with the detectors loop and address. A floor plan of the room showing the detectors and addresses shall be located adjacent to the cover plate. Provide Plexiglas cover over the plan.

ADDRESSABLE PULL STATIONS
Pull stations shall contain circuits that communicate the station's status (alarm, normal or trouble) to the control panel over two wires, which also provide power to the pull station. The address shall be field programmable on the station.

Manual stations shall be single-action type, constructed of metal or of high impact, red Lexan with raised white lettering and a smooth high gloss finish.

Station shall mechanically latch upon operation and remain so until manually reset by means of a key common to all system locks. Stations that require Allen wrenches or special tools to reset them shall not be accepted.

Manual stations shall be fitted with screw terminals or wire leads for field wire attachment.

INTERFACE MODULES - GENERAL
If external power to Addressable Interface Modules is required, such power shall be 24VDC, and shall be derived from a supervised fire alarm power supply.

Addressable Interface Modules may be provided in either a Class B or Class A supervision version.

In the Class B version the wiring shall be supervised by an end-of-line device.

In the Class A version the wiring shall be looped back and connected to the module to allow continual operation of the controlled devices even if the wiring sustains a single break.

The interface modules shall be supervised and uniquely identified by the control panel. Device identification shall be transmitted to the control panel for processing according to the program instructions.

INTERFACE MODULES - SUPERVISED CONTROL
Supervised Control Modules shall be utilized where needed, for control of Notification Appliances.

For Notification Appliances, speakers, and other device control with Class B or Class A wiring supervision, the interface module shall provide a double-pole/double-throw relay output, with supervision.

These interface modules shall communicate the supervised wiring status (normal, trouble) to the fire alarm control panel and shall receive from the fire alarm control panel a command to transfer the relay.

INTERFACE MODULES - SUPERVISED MONITORING
Addressable Monitor Modules shall be suited for monitoring of water-flow, valve tamper, Fire Suppression Control Panels, and other non-intelligent detectors and systems.

Addressable Monitor Modules shall be provided in any needed configuration, and may be used to interface any of the following initiation devices to a Signaling Line Circuit, as follows:

Conventional 2-wire smoke detectors, including providing suitable power to the IDC.

Normally Open, dry contact type devices - with class B or class A wiring supervision:
These interface modules shall communicate the Initiating Device Circuit status (normal, alarm, trouble) to the control panel.

INTERFACE MODULES - NON-SUPERVISED CONTROL
This interface module shall provide double-pole/double-throw relay switching for loads up to 120VAC. It shall contain easily replaceable 2 amp fuses, one on each common leg of the relay.

FAULT ISOLATOR MODULE (FIM)
The system shall employ Fault Isolator Modules (FIM) on the Signaling Line Circuits. These FIM units shall be utilized in order to isolate portions of SLCs, in the event of short circuit conditions. The SLC segment protected by each FIM shall be separated from the SLC in a manner such that a single short-circuit condition may not affect more than 25 Addressable Field Devices / Detectors, which are served by the isolated SLC segment.

The FIM shall be located as close as practical to the point where the isolated SLC sub-circuit branches, and shall also be located at an accessible location.

CONVENTIONAL PERIPHERAL DEVICES
SPRINKLER WATERFLOW SWITCHES – WET SYSTEMS
Waterflow switches shall be individually monitored, via individual IDCs, Monitor Modules, or Mini Monitor Modules. The point corresponding to each Waterflow switch shall be programmed such that when activated, the suitable Fire Alarm sequence shall be initiated.

If the flow switch incorporates an internal "cover tamper switch", which actuates whenever the flow switch assembly cover is removed, the Trouble sequence shall be initiated in response to the removal of this cover.

SPRINKLER VALVE TAMPER SWITCHES – WET SYSTEMS
Tamper switches shall be individually monitored by individual IDCs, Monitor Modules, or Mini Monitor Modules (Where two Valves, with Tamper Switches, are provided on both sides of a backflow preventer / double check valve assembly, such tamper switches may be monitored as a single point). The point corresponding to each Tamper Switch shall be programmed such that whenever the valve is partially closed, the Supervisory sequence shall be initiated.

If the tamper switch incorporates an internal "cover tamper switch", which actuates whenever the flow switch assembly cover is removed, the Trouble sequence shall be initiated in response to the removal of this cover.

AUDIO VISUAL NOTIFICATION APPLIANCES
SPEAKERS
Speakers shall have a metal or Lexan housing with field adjustable output taps ranging from 1/4 watt to 2 watts. Speakers selected for this project shall produce a Sound Pressure Level, at the 1 watt tap of at least 86 dBA at 10 feet – as tested per UL Standard 1480. Speakers shall have vandal resistant Lexan or metal grilles and shall be have sealed backs to protect the phenolic impregnated cone.

HORNS
All horns shall be polarized, and shall be compatible with the 24 VDC NACs provided by the control panel and/or NAC Booster Panels/Supervised Control Modules. Each horn assembly shall include separate wire leads for in/out wiring for each leg of the associated signal circuit.

Horns shall be UL listed to provide a minimum sound pressure level of 93 dB at 10 feet, per UL Standard 464.

STROBES
ALL strobes, and the strobe portion of audible/strobe combination units, shall be of the Xenon type.

All strobes shall be designed for synchronized flash operation at one flash per second (1 Hz) minimum over the device's listed input voltage range. Strobes shall be synchronized such that all strobe units within the building shall flash simultaneously (As a minimum, all devices on each floor shall flash simultaneously, with flash timing within the limits established by current UL standards.).

PART 3 - EXECUTION

GENERAL
The complete installation shall be done in a neat, workmanlike manner in accordance to the applicable requirements of NFPA 70 - Article 760 and the manufacturer's recommendations.

Smoke detectors shall not be mounted until the construction is completed, unless they are covered with plastic bags or fitted covers immediately after installation to maintain cleanliness.

RACEWAYS
NOTE: ALL FIRE ALARM SYSTEM WIRING SHALL BE INSTALLED WITHIN METALLIC CONDUIT UNLESS SPECIFIED.

All wiring shall be in a conduit system separate from other building wiring. See Section 260533 – Raceway and Boxes for Electrical Systems for specifications.

All wiring shall be in minimum 1/2" steel raceway.

40% fill factor shall be applied to all conduit sizes.

The contractor shall size conduit and boxes by circular mil size of each cable in each conduit or box. The circular mil sizing can be found on the manufacture's spec sheet, then use the NEC codebook to make calculation to follow NEC Chapter 9 Tables and Annex C for box and conduit fill.

There shall be no sharp edges with installed materials.

Use only identified conduit entries or request approval for other penetrations in cabinets; (certain areas require clear space for interior components / batteries). Cabinet shall be grounded to either a cold water pipe or grounding rod.

Existing conduit and surface metal raceway that is 1/2” in size or larger may be reused if found to have adequate space provided that it only serves the Fire Alarm system and doesn’t contain any AC wiring. All existing conduit that is reused MUST be brought up to the current State of Wisconsin Electrical Code and Approved for usage by the Engineer prior to work being done.

Devices wired with conduit shall be provided with an 8-inch wire tail at each device box and 36-inch wire tails at the FACP and FAAP.

To reduce or eliminate EMI, the following minimum separation distances from ≤480V Power lines shall be adhered to:

12 inches from power lines of <5-kVa.
18 inches from high voltage lighting (including fluorescent).
39 inches from power lines of 5-kVa or greater.
39 inches from transformers and motors.

All cable shall be free of tension at both ends. In cases where the cable must bear some stress, Kellom grips may be used to spread the strain over a longer length of cable.

Manufacturers minimum bend radius specifications shall be observed in all instances. Care should be taken in the use of cable ties to secure and anchor the fire alarm cabling. Ties should not be over tightened as to compress the cable jacket. No sharp burrs should remain where excess length of the cable tie has been cut.

All vertical cable extensions to fire alarm devices located below the finished ceiling shall be in conduit.

It is the contractors' responsibility to survey the site and include all necessary costs to perform the installation as specified. This includes any modifications required to route and conceal horizontal distribution wiring.

Beginning installation means contractor accepts existing conditions.

Contractor shall furnish all required installation tools to facilitate cable pulling without damage to the cable jacket. Such equipment is to include, but not limited to, sheaves, winches, cable reels, cable reel jacks, duct entrance tunnels, pulling tension gauge and similar devices. All equipment shall be of substantial construction to allow steady progress once pulling has begun. Makeshift devices, which may move or wear in a manner to pose a hazard to the cable, shall not be used.

All cable shall be pulled by hand unless installation conditions require mechanical assistance. Where mechanical assistance is used, care shall be taken to insure that the maximum tensile load for the cable as defined by the manufacturer is not exceeded. This may be in the form of continuous monitoring of pulling tension, use of a “break-away” or other approved method.

The contractor will be responsible for identifying and reporting to the Site Coordinator(s) any existing damage to walls, flooring, tiles and furnishings in the work area prior to start of work. The Contractor must repair all damage to interior spaces caused by the installation of cable; raceway or other hardware. Repairs must match preexisting color and finish of walls, floors and ceilings. Any contractor-damaged ceiling tiles are to be replaced to match color, size, style and texture.

Where unacceptable conditions are found, the Contractor shall bring this to the attention of the construction supervisor immediately. A written resolution will follow to determine the appropriate action to be taken.

Qualified personnel utilizing state-of-the-art equipment and techniques shall complete all installation work. During pulling operation an adequate number of workers shall be present to allow cable observation at all points of duct entry and exit as well as the feed cable and operate pulling machinery.

Cable pulling shall be done in accordance to cable manufacturer's recommendations and ANSI/IEEE C2 standards. Manufacturer's recommendations shall be a part of the cable submittal. Recommended pulling tensions and pulling bending radius shall not be exceeded. Any cable bent or kinked to radius less than recommended dimension shall not be installed.

Avoid abrasion and other damage to cables during installation.

Pulling Lubricant may be used to ease pulling tensions. Lubricant shall be of a type that is non-injurious to the cable jacket and other materials used. Lubricant shall not harden or become adhesive with age.

A pull cord (nylon; 1/8" minimum) shall be co-installed with all cable installed in any conduit.]

CONDUCTORS

All wire and cable associated with this system shall be as required by the equipment manufacturer. The following information is intended for estimating purposes only. However, the minimum wire gauges and colors specified shall be strictly adhered to. All cable shall be installed as per NEC Article 760.

Type FPL wiring is required if the system is run in conduit or 'free-air.

All initiation and notification circuit cabling shall be listed Type FPL (300V) in accordance to NEC article 760."

All cables and wires #14 AWG and larger shall be stranded.

Fire alarm wiring shall be held in place at the device box, by means of a two-screw connector, (do not use squeeze or crimp type connectors).

All wiring shall be completely supervised. In the event of a primary power failure, disconnected standby battery, disarrangement of any components, any open circuits or grounds in the system, an audible and visual trouble signal shall be activated until the system is restored to normal.

All conductors shall be color-coded. Coding shall be consistent throughout the facility. Green wire shall be used only for equipment ground.

Each Fire Alarm Control Panel, Annunciator Panel, shall be connected to separate dedicated branch circuit from the building emergency panel, maximum 20 amperes. Circuit shall be labeled as "FIRE ALARM". The breaker shall be painted red and cap-locked.

Power wiring for Fire Alarm Control Panel, Annunciator Panel, shall be #12 AWG.

Fire Alarm Control Panel, [Annunciator Panel], [and Remote Fire Command Center] shall have #6 AWG green equipment ground wire.

Fire alarm risers, notification appliance circuits and interconnections to remote panels (per NFPA 72) shall have a minimum 2Hr fire alarm rating. All notification appliance circuits shall be protected from the fire alarm panel of origination to the signaling zone they serve.

Cable for Intelligent detector Loops shall be 18 to 12 AWG twisted pair with a shield jacket or per manufacturers recommendations installed in ½" conduit. Shield continuity must be maintained and connected to earth ground only at the control panel.

SLC wiring must not be in the same conduit with AC power wiring or other high current circuits. T-taps or branch circuit connections are allowed for all class B SLCs.

Cable for RS 232-c devices (CRT, PRINTER) shall be dual pair twisted- shielded.

Cable for RS 485 devices (Remote Annunciators) shall be twisted-shielded pair (Belden 9841 or equivalent) for the data signal. Power wiring shall be 12 AWG.

All splices or connections shall be made within approved junction boxes and with approved fittings. Boxes shall be red and labeled "FIRE ALARM SYSTEM" or “FA” by decal or other approved markings.

Speaker and strobe circuits shall have separate conductors, and shall operate independently of each other.

Mini horn wiring shall be #14 AWG minimum.

Speaker wiring shall be #18 AWG twisted-shielded cable or per manufacturers recommendations.

Strobe wiring shall be #14 AWG minimum.

Tray cable is not acceptable for use as fire alarm system wiring installed in conduit.

DEVICE MOUNTING
Unless otherwise noted on the drawings, plans, specifications or by the Architect or Engineer; the recommended mounting heights, and requirements are as follows:

FIRE ALARM CONTROL PANELS
Mount control panels such that all visual indicators and controls are located at 60 inches above floor level.

ANNUNCIATOR/REMOTE FIRE COMMAND CENTER PANELS
Mount FAAP/RFCC panels such that all visual indicators and controls are located at 60 inches above floor level.

VISUAL AND AUDIO / VISUAL NOTIFICATION APPLIANCES
In Public-Mode Areas, as defined within NFPA-72, install flush, semi-flush or surface between 80 inches and 96 inches or 6 inches below finished ceiling or at 80 inches from the bottom of the device to the highest level of the finished floor. No devices protruding 4 inches or more shall be installed lower than 80 inches. If these requirements are not achievable, consult with the Engineer before installation.

Audio/visual devices may be installed on the ceilings only where indicated, or where approved in writing by the Engineer. (In such cases, these devices shall be installed in accordance to current NFPA 72 standards).

Except as noted in the previous paragraph, all audio/visual devices shall be installed at the same height throughout the facility.

For surface mounting, use manufacture-supplied back boxes and trim plates, which shall be painted Red or off White, and shall contain no visible conduit knock-outs. Mark each device with its circuit number.

MANUAL STATIONS
The operable part of the manual stations shall be installed not less than 3 ½ ft. (42") and not more than 4 ft. (48”) above finished floor. All Manual Stations shall be in unobstructed locations. Mark the unit’s address on the inside and outside of housing.

All manual pull stations shall be installed at the same height throughout the facility.

For surface mounting, use manufacture-supplied back boxes and trim plates. Back boxes shall be painted Red or off White, and shall contain no visible conduit knock-outs. Mark each device with its loop and address.

During the installation of the new fire alarm systems, new pull stations should be covered or identified as not being operable so building occupants will not be confused as to which fire alarm pull station should be pulled during an alarm condition. Likewise, after the new system is installed, tested and accepted, the existing pull stations should be identified as not being operable (or permanently removed as soon as possible).

HEAT AND SMOKE DETECTORS

The location of detectors shown on the plans is schematic only. The detectors must be located according to code requirements.

Surface mounted detectors shall be installed using back boxes equal to the base's size. Standard octagon and square boxes are not acceptable.

Detectors should be located on the highest part of a smooth ceiling so that the edge of the detector is no closer than 4 inches from a sidewall. Ceilings with beams, joists or soffits that exceed 8 inches in depth require special planning and closer spacing.

If it is necessary to mount a detector upon a sidewall, the top of the detector (the sensing chamber portion of the device) shall be located no closer than 4 inches from the ceiling and no further away than 12 inches.

Smoke detectors should be installed to favor the air flow towards return openings and not located closer than 3 feet from air supply diffusers which could dilute smoke before it reaches the detector. No detectors shall be installed in direct airflow.

Duct smoke detector installation to be by this contractor and should be installed in the locations shown on the mechanical and electrical plans. Ensure that the duct smoke detectors are in serviceable locations. Consult with the mechanical designer for alternate locations if these are shown in non-serviceable locations. When locations on mechanical plans are not available, install in locations called for that provide accessibility for service. Do not install within four feet of a fan discharge

Heat and smoke detectors should be located near the center of the open area which they are protecting, thus providing coverage generally for 15-foot radius for heat and smoke detectors. Questionable locations shall be verified with Architect or Engineer before installation takes place.

Heat and smoke detectors / Sensors – both Intelligent and non-addressable, shall be installed in accordance to their UL Listed Spacing. The quantity of Heat and smoke detectors / Sensors depicted on the drawings is based on the 900 square foot per detector rule. If detectors with significantly different spacing requirements are selected by the Fire

Alarm equipment provider / EC, then additional detectors / sensors, if required, shall be provided at no additional cost to the project.

IDENTIFICATION

Attach the label containing the address and SLC designation to:
Each addressable detector. Label shall be visible and readable from the floor, 3/16" minimum character size (¼" is recommended).
Each manual pull station. Label shall be placed on the top part
Each Addressable Module. Label shall be attached to the faceplate

Label shall consist of black writing on white or clear background.

All junction boxes shall be painted red and labeled "Fire Alarm" or "FA".

All circuits must be labeled with the name of circuit and the area being served by the circuit.

Wire/cable splices in junction boxes shall be labeled indicating where the wire/cable is coming from and where it is going.

All conductors terminated in control panels, annunciator panels and extension panels shall be labeled.

All audio visual devices shall be labeled by each circuit and the order of the device on that circuit such as "Circuit No. 2, strobe No. 05 of 10".

All labels shall be permanent, and be machine generated. NO HANDWRITTEN OR NON-PERMANENT LABELS SHALL BE ALLOWED. Submit a sample for approval before using any labeling schemes.

Label size shall be appropriate for the conductor or cable size(s) and design. All labels to be used shall be self-laminating, white/transparent vinyl and be wrapped around the cable (sheath). Flag type labels are not allowed. The labels shall be of adequate size to accommodate the circumference of the cable being labeled and properly self-laminate over the full extent of the printed area of the label.

Adhesive type labels not permitted except for phase and wire identification.

TESTING

Before proceeding with any testing, all persons, facilities and building occupants whom receive alarms or trouble signals shall be notified by the contractor to prevent unnecessary response or building occupant distress. At the conclusion of testing, those previously notified shall be notified that testing has been concluded.

The manufacturer's authorized representative shall provide on-site supervision of installation of the complete fire alarm system installation, perform a complete functional

test of the system, and submit a written report to the Contractor attesting to the proper operation of the completed system prior to final inspection.

Contractor shall pre-test each and every device in the system before the system is considered ready for final inspection.

The completed and pre-tested fire alarm system shall be fully tested in accordance to NFPA-72 by the Contractor in the presence of the Engineer, WisDOT representative, Owner's representative and the local Fire Marshal.

The Engineer or his authorized representative may suspend or discontinue the tests at any time performance is considered unsatisfactory. Resumption of testing will cover untested elements and any replaced elements. The contractor shall furnish all test personnel, test instruments and equipment of the accuracy necessary to perform the test. Arrangements for testing must be made with the WisDOT representative and the Engineer at least two weeks before the proposed testing date.

Upon the completion of a successful test, and prior to the final request for payment the Contractor shall:
Certify the system to the Owner in writing
Complete the NFPA 72 record of completion form
Provide as builts and O&M manuals.
Provide a signed statement that the Owner had received the specified system operation and maintenance training

The final payment will not be processed unless these documents are complete and are on hand.

WARRANTY
The Contractor shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of two (2) years from the date of substantial completion of the project.

At the end of the project, the Contractor shall post the warranty period along with the company’s name and telephone number inside the fire alarm panel.

Any occupied facility shall not be without a UL and an NFPA approved and fully operational fire alarm system for a period longer than 2 hours. Emergency response shall be provided within 2 hours of the notification, to the contractor, of the failure of the system to perform operationally per UL and NFPA standards. Non-emergency service calls shall be responded to within 24 hours of the notification to the contractor.

Emergency situations may include, but not limited to:
System can't be acknowledged or reset
System is non-responsive to commands
System in non-responsive to actuated alarm devices
Malfunction of notification/initiating circuit(s)
System going into alarm/trouble without indicating the source
System is dead (no power), etc.

Repairs and/or replacement arising from emergency situations shall be completed within 24 hours of the time of notification. Other than emergency, actual repairs and /or replacement shall be provided within 72 hours of the time of notification during normal working hours, Monday through Friday, excluding holidays. If the repairs involve parts that are not shelve items and require lead time, the contractor shall inform the Owner within 24 hours from the time of notification of the exact time when the repairs will be completed.

If repair and/or replacement cannot be made within the prescribed time, then other means and methods of protection shall be provided to insure the safety of the building's occupants during which time the system is not in compliance with the standards. This may involve up to and include hiring Owner approved qualified personnel to stand a fire watch, all at the contractor's expense.

Warranty service for the equipment shall be provided by the system supplier's factory trained representative. Further, Warranty shall include all parts, labor and necessary travel.

TRAINING
All training provided for agency shall comply with the format, general content requirements and submission guidelines specified under Division 1. The Contractor through his/her supplier shall provide, as part of this contract, a minimum of two hours system operation training for owner, the Architect/Engineer, and fire department personnel. The training session shall consist of the following sessions:

One, 2 Hour session-hour sessions for the purpose of training personnel who will need to operate the system – primarily, Level 1 and Level 2 system operators / users.

All training sessions shall be coordinated and scheduled by the EC, and shall be conducted at a time to be stipulated by the owner. All training and other indoctrination shall be completed prior to final inspection.

The contractor shall record all training and instructional sessions on DVD. Provide a separate DVD for each system and label for the system demonstrated and turnover to the Owner.

Training shall not take place until all systems are 100% operational as determined by the Owner. The purpose of training is to fully prepare the facility maintenance staff for complete operational responsibility of the fire alarm system.

The facility maintenance staff shall be fully trained and be given the capability by the product Vendor and installing Contractor to modify, to program, to fully repair, to service, and to maintain the system after (and if desired, during) the warranty period.

The above training shall include, but not be limited to, providing and reviewing all programming software, access codes, and licenses that allow the Owner to add or to delete any points (i.e.: The mapping of devices), and to change a heat detector to a smoke detector. To meet this requirement, provide the necessary configuration and/or access code (hardware and/or software key). If the Vendor cannot meet this requirement, the product is not acceptable

SPECIAL CONSIDERATIONS
Contractor shall refer to Division 1, General Requirements.

The contractor must maintain the existing fire alarm system operational during the construction period. During periods of construction where dust or dirt may contaminate the existing detectors, the contractor shall cover the detectors to avoid nuisance alarms and trouble-calls.

Individual zones and/or devices of the existing fire alarm system can be bypassed by the contractor during construction under the following requirements:

The WisDOT is notified of which zones and/or devices are inoperative and for how long in writing, hand delivered.

The contractor covers all manual-pull stations that are not active and post temporary fire alarm notification procedures next to each inactive manual-pull station.

Ensure the fire alarm system is fully operational before leaving the job site.

Ancillary signals are acceptable during the construction period.

CONSTRUCTION VERIFICATION
Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 017839 Project Record Documents.

END OF SECTION 283100

ADDITIONAL SPECIAL PROVISION 1 (ASP 1)
FOR TRANSPORTATION ALLIANCE FOR NEW SOLUTIONS (TrANS)
PROGRAM EMPLOYMENT PLACEMENTS AND APPRENTICESHIPS

The Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Section 5204(e) – Surface Transportation Workforce Development Training and Education, provides for 100 percent Federal funding if the core program funds are used for training, education, or workforce development purposes, including "pipeline" activities. The core programs includes: Congestion Mitigation and Air Quality Improvement (CMAQ) Program, Highway Bridge Program (HBP), Interstate Maintenance (IM), National Highway System (NHS), and Surface Transportation Program (STP). These workforce development activities cover surface transportation workers, including OJT/SS programs for women and minorities as authorized in 23 U.S.C. §140(b).

TrANS is an employment program originally established in 1995 in Southeastern Wisconsin. Currently TrANS has expanded to include TrANS program locations to serve contractors in Southeast (Milwaukee and surrounding counties), Southcentral (Dane County and surrounding counties including Rock County), and most Northeastern Wisconsin counties from locations in Keshena, Rhinelander and surrounding far Northern areas. TrANS attempts to meet contractor's needs in other geographic locations as possible. It is an industry driven plan of services to address the outreach, preparation, placement and retention of women, minorities and non-minorities as laborers and apprentices in the highway skilled trades. These candidate preparation and contractor coordination services are provided by community based organizations. For a list of the TrANS Coordinators contact the Disadvantaged Business Enterprise Office at (414) 438-4583 in Milwaukee or (608) 266-6961 in Madison. These services are provided to you at no cost.

I. BASIC CONCEPTS

Training reimbursements to employing contractors for new placements, rehires or promotions to apprentice of TrANS Program graduates will be made as follows:

1) **On-the-Job Training, Item ASP.1T0G, ASP 1 Graduate.** At the rate of $5.00 per hour on federal aid projects when TrANS graduates are initially hired, or seasonally rehired, as unskilled laborers or the equivalent.

   Eligibility and Duration: To the employing contractor, for up to 2000 hours from the point of initial hire as a TrANS program placement.

   Contract Goal: To maintain the intent of the Equal Employment Opportunity program, it is a goal that __3__ *(number)* TrANS Graduate(s) be utilized on this contract.

2) **On-the-Job Training, Item ASP.1T0A, ASP 1 Apprentice.** At the rate of $5.00 per hour on federal aid projects at the point when an employee who came out of the TrANS Program is subsequently entered into an apprenticeship contract in an underutilized skilled trade (this will include the Skilled Laborer Apprenticeship when that standard is implemented).

Eligibility and Duration: To the employing contractor, for the length of time the TrANS graduate is in apprentice status.

Contract Goal: To maintain the intent of the Equal Employment Opportunity program, it is a goal that __2__ *(number)* TrANS Apprentice(s) be utilized on this contract.

3) The maximum duration of reimbursement is two years as a TrANS graduate plus time in apprentice status.

4) If a TrANS program is not available in the contractor's area and another training program is utilized, payment of On-the-Job Training hours may be approved by the Wisconsin Department of Transportation (WisDOT) if the training program meets the established acceptance criteria. Only On-the-Job Training Hours accumulated after WisDOT approval will be reimbursed as specified under Items ASP.1T0G and ASP.1T0A. For more information, contact the Disadvantaged Business Enterprise Office at the phone numbers listed above.

5) WisDOT reserves the right to deny payments under items ASP.1T0G and ASP.1T0A if the contractor either fails to provide training or there is evidence of a lack of good faith in meeting the requirements of this training special provision.

I. RATIONALE AND SPECIAL NOTE

The $5.00 per hour now being paid for TrANS placements is intended to cover the duration of two years to allow for reaching entry-level laborer status. An additional incentive, the $5.00 rate, would promote movement into the underutilized skilled trades' apprenticeships and applies until the individual completes their apprenticeship. These incentives benefit TrANS candidates by giving them a better opportunity to enter a skilled trade; benefits contractors who will be assisted in meeting their EEO profiles and goals; and benefits the public who will see the program reinforce larger public-private employment reform in Wisconsin. The pool of TrANS graduates was created for the purpose of addressing underutilization in the skilled trades, an objective that is further reinforced by a parallel retention pilot program, known as the Companywide Reporting. *Whether or not reimbursement is involved, the WisDOT reassures contractors who are in the Companywide Program that TrANS placements still contribute toward fulfilling the new hire goal of 50% women and minorities.* Based on data administered by United States Department of Labor (US DOL), the highway skilled trades remain underutilized for women statewide (less than 6.9%); and for minorities in all counties (% varies by county).

NOTE: *Unless using other advancement strategies, contractors are encouraged to use some or all of this monetary incentive to offset the cut in hourly wages an individual may incur when entering an apprenticeship if the full general laborer hourly rate has been previously paid. No special accounting measures are required.*

II. IMPLEMENTATION

The implementation of ASP 1 is intended to cover only the amount of time it takes for underutilization to be resolved across the trades. This will be measured annually at the county and/or state levels using data administered by WisDWD in relation to goals set by the USDOL-

OFCCP. With appropriate state and federal approvals, we may also do some measurement at the company level.

It is the contractor's responsibility to note on their Certified Payrolls if their employee is a TrANS graduate or a TrANS apprentice. The District EEO Coordinators utilize the information on the Certified Payrolls to track the hours accumulated by TrANS Graduates and TrANS apprentices on WisDOT contracts. Payment under this ASP 1 is made based on the hours recorded off of the Certified Payrolls. Tracking may eventually include improved linkages with the WisDWD apprentice database, information from company and committee level sources.

TrANS is nondiscriminatory by regulation, and is a tool for optional use by contractors to address the underutilization of women and minorities as laborers and apprentices in our industry's skilled trades.

IV. *TRANS TRAINING*

As part of the contractor's equal employment opportunity affirmative action program, training shall be provided to employees enrolled in apprenticeship and on-the-job training programs as follows:

The contractor shall provide on-the-job training aimed at developing full journey workers in the type of trade or job classifications involved. In the event the contractor subcontracts a portion of the contract work, the contractor shall determine how many, if any, of the trainees are to be trained by the subcontractor provided, however, that the contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The contractor shall also insure that this training special provision is made applicable to such subcontract.

Training and upgrading of minorities and women toward journey workers status is a primary objective of this training special provision. Accordingly, the contractor shall make every effort to enroll minority trainees and women (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority trainees and women trainees); to the extent such persons are available within a reasonable area of recruitment. The contractor will be given an opportunity and will be responsible for demonstrating the steps that they have taken in pursuance thereof, prior to determination as to whether the contractor is in compliance with this training special provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee in any classification in which they have successfully completed a training course leading to journey workers status or in which they have been employed as a journey worker. The contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used, the contractor's records should document the findings in each case.

V. APPRENTICESHIP TRAINING

The Federal Highway Administration's (FHWA) policy is to require full use of all available training and skill improvement opportunities to assure increased participation of minority groups, disadvantaged persons and women in all phases of the highway construction industry. The FHWA On-the-Job Training (OJT) Program requires the State transportation agencies (STAs) to establish apprenticeships and training programs targeted to move women, minorities, and disadvantaged individuals into journey-level positions to ensure that a competent workforce is available to meet highway construction hiring needs, and to address the historical under-representation of members of these groups in highway construction skilled crafts.

The OJT Supportive Services (OJT/SS) Program was established in Title 23 Code of Federal Regulations (CFR), Part 230) to supplement the OJT program and support STA training programs by providing services to highway construction contractors and assistance to highway construction apprentices and trainees. The primary objectives of OJT/SS are:

(1) To increase the overall effectiveness of the State highway agencies' approved training programs.
(2) To seek other ways to increase the training opportunities for women, minorities, and disadvantaged individuals.

The STAs are responsible for establishing procedures, subject to the availability of Surface Transportation and Bridge Funds under 23 U.S.C. §140(b*)* (Nondiscrimination), for the provision of supportive services with respect to training programs approved under 23 CFR, Part 230(a*)* (Equal Employment Opportunity on Federal and Federal-aid Construction Contracts – including Supportive Services).

The contractor and subcontractor shall maintain records to demonstrate compliance with these apprenticeship requirements. Reasonable exemptions and modifications to and from any or all of these requirements will be determined by the Wisconsin Department of Transportation-Civil Rights Office. A request for an exemption or modification, with justification, shall be made in writing, addressed to WisDOT Civil Rights Office, 4802 Sheboygan Avenue, P.O. Box 7965, Rm. 451, Madison, WI 53707.

ADDITIONAL SPECIAL PROVISION 3
DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

1. Description

General

a. The disadvantaged business enterprise (DBE) requirements of 49 CFR Part 26 apply to this contract. The department's DBE goal is shown on the cover of the bidding proposal. The contractor can meet the specified contract DBE goal by procuring services or materials from a DBE or by subcontracting work to a DBE. The department calculates the DBE participation as the dollar value of DBE participation included in the bid expressed as a percentage of the total contract bid amount.

b. Under the contract, the contractor agrees to provide the assistance to participating DBE's in the following areas:

   i. Produce accurate and complete quotes.
   ii. Understand highway plans applicable to their work.
   iii. Understand specifications and contract requirements applicable to their work.
   iv. Understand contracting reporting requirements.

c. The department encourages the contractor to assist and develop DBE firms to become fully knowledgeable contractors to successfully perform on its contracts.

d. For information on the disadvantaged business program, visit the department's Civil Rights and Compliance Section website at:

   http://www.dot.wisconsin.gov/business/engrserv/dbe-main.htm

2. Definitions

a. Interpret these terms, used throughout this additional special provision, as follows:

   i. **Bid Percentage:** The DBE percentage indicated in the bidding proposal at the time of bid.
   ii. **DBE:** A disadvantaged business enterprise (DBE) certified as a DBE by the department and included on the department's list of certified DBE's who are determined to be ready, willing and able.
   iii. **DBE goal:** The amount of DBE participation expected in the contract as shown on the cover of the Highway Work Proposal.
   iv. **Discretionary Goal:** A contractor assigned DBE goal, typically abbreviated as “Disc” on the cover of the Highway Work Proposal, which is enforced as committed.
   v. **Manufacturer:** A firm that operates or maintains a factory or establishment that produces, on the premises, the materials, supplies, articles, or equipment required under the contract.
   vi. **Supplier:** A firm that owns, operates, or maintains a store, warehouse, or other establishment in which the materials, supplies, articles or equipment required under the contract are bought, kept in stock, and regularly sold or leased to the public.
   vii. **Voluntary Achievement:** The amount of DBE participation achieved and reported in the contract in excess of the assigned goal.

3. DBE Percentage Required at Bid Submission

Indicate the bid percentage (i.e. 0% through 100%) of DBE participation on the completed bidding proposal, including projects with discretionary goals. For electronic submittals, show the percentage in the miscellaneous data folder, Item 3, DBE Percent. For paper submittals, show the percentage on the sheet included after the schedule of items. By submission of the bid, the bidder contractually commits to DBE participation at or above the bid percentage, or certifies that they have utilized

comprehensive good faith efforts to solicit and utilize DBE firms to meet the DBE participation requirements of this contract proposal, and that the bid percentage is reflective of these good faith efforts. If the bidder does not indicate the bid percentage of DBE participation on the completed bidding proposal, the department will consider the bid irregular and may reject the bid.

4. Department's DBE Evaluation Process

a. Documentation Submittal

Within 10 business days after the notification of contract award, the contractor is to identify, by name, the DBE firms whose utilization is intended to satisfy this provision, the items of work of the DBE subcontract or supply agreement and the dollar value of those items of work by completing the Commitment to Subcontract to DBE Form [DT1506] and all necessary attachment A forms, as well as, Good Faith Waiver Form [DT1202] and supporting documentation as necessary. If the contractor fails to furnish the required forms within the specified time, the department may cancel the award. Delay in fulfilling this requirement is not a cause for extension of the contract time and shall not be used as a tool to delay execution.

i. Bidder Meets DBE Goal

If the bidder indicates that the contract DBE goal is met, after award and before execution, the department will evaluate the Commitment to Subcontract to DBE Form DT1506 and attachment A(s) to verify the actual DBE percentage achieved. If the DBE commitment is verified, the contract is eligible for execution with respect to the DBE commitment.

ii. Bidder Does Not Meet DBE Goal

(1) If the bidder indicates a bid percentage on the Commitment to Subcontract to DBE Form [DT1506] that does not meet the contract DBE goal, the bidder must submit a Good Faith Waiver Form [DT1202] and supporting documentation. After award and before execution, the department will evaluate the bidder's DBE commitment and consider the bidder's good faith waiver request.

(2) The department will review the bidder's good faith waiver request and notify the bidder of one of the following:

a. If the department grants a good faith waiver, the bid is eligible for contract execution with respect to DBE commitment.

b. If the department rejects the good faith waiver request, the department may declare the bid ineligible for execution. The department will provide a written explanation of why the good faith waiver request was rejected. The bidder may appeal the department's rejection as allowed under 7 a. & b.

5. Department's Criteria for Good Faith Effort

The Code of Federal Regulations {CFR}, 49 CFR Part 26-Appendix A, is the guiding regulation concerning good faith efforts. However, the federal regulations do not define “good faith” but states that bidder must actively and aggressively attempt to meet the goal. The federal regulations are general and do not include every factor or effort that can be considered. As a result, each state must establish its own processes and consider the factors established in its own process when making a determination of good faith.

a. The department will only grant a good faith waiver if the bidder has made the effort, given the relevant circumstances under the contract that a bidder actively and aggressively seeking to meet the goal would make. The department will evaluate the bidder's good faith effort to determine whether a good faith waiver will be granted. The bidder must demonstrate, on the DT1202 that they have aggressively solicited DBE participation in an attempt to meet the contract DBE goal and attaining the stated DBE goal is not feasible.

b. The department, in conjunction with industry stakeholders, has developed the following guidance for contractor good faith effort. The guidance and the attached appendices provide a framework for the actions required by all parties in the processing and evaluation of bidder's total efforts to achieve the project specific DBE goal prior to the bid letting date.

c. Prime Contractors should:

i. Document all efforts and decisions made toward achieving the DBE goal on the contract. The bidder should use the Civil Rights & Compliance System [CRCS] and related WisDOT-approved DBE outreach tools, including the Bid Express Small Business Network, to foster DBE participation on all applicable contracts.

ii. Request quotes by identifying potential items to subcontract and solicit. Prime contractors are strongly encouraged to include in their initial contacts a single page including a detailed list of items for which they are accepting quotes, by project, within a letting. *See attached sample entitled "Sample Contractor Solicitation Letter" in Appendix A*. Prime contractors should also indicate a willingness to accept quotes in areas they are planning to perform themselves, ***as required by federal rules***. In some cases, it might be appropriate to use DBE's to do work in a prime contractor's area of specialization.

(1) Solicit quotes through all reasonable and available means from certified DBE firms who match 'possible items to subcontract' and send copies to DBESS office, highlighting areas in which you are seeking quotes. Email is acceptable.

(2) SBN is the preferred outreach tool. https://www.bidx.com/wi/main. Other acceptable means include postal mail, email, fax, phone call.

a. Primes must ask DBE firms for a response in their solicitations. See *Sample Contractors Solicitation Letter* in Appendix. This letter can be included as an attachment to the SBN sub-quote request.

b. Solicit quotes at least 10 calendar days prior to the letting date {ideally two Fridays before the letting} to allow DBE firms sufficient time to respond. Prime contractors should contact DBE firms early, asking them if they need help in putting together a quote, or helping to arrange for equipment needs, or solve other problems.

(3) Second solicitation should take place within 5 days

a. An email solicitation is highly recommended for this second solicitation

(4) Upon request, provide interested DBE firms with adequate information about plans, specifications and the requirements of the contract by letter, information session, email, phone call and/or referral.

(5) When potential exists, advise interested DBE firms on how to obtain bonding, line of credit or insurance as may be requested.

(6) Document DBE firm's interest in quoting by taking appropriate steps to follow up initial solicitation with:

a. Email to all prospective DBE firms in relevant work areas
b. Phone call log to DBE firms who express interest via written response or call.
c. Fax/letter confirmation
d. Copy of the DBE quotes
e. Signed copy of Bid Express SBN Record of Subcontractor Outreach Effort.

d. Evaluate DBE quotes as documentation is critical if the prime does not utilize the DBE firm's quote for any reason.

i. Evaluate DBE firm's capability to perform 'possible items to subcontract' using legitimate reasons, including but not limited to, ***a discussion with the DBE firm*** regarding its

capabilities prior to the bid letting. If lack of capacity is your reason for not utilizing the DBE quote, you are required to contact the DBE directly regarding their ability to perform the work indicated in the UCP directory as their work area [NAICS code]; only the work area and/or NAICS code listed in the UCP directory will be counted for DBE credit. Documentation of the conversation is required.

ii. In striving to meet a DBE conscious contract goal, prime contractors are expected to use DBE quotes that are responsive and reasonable. This includes DBE quotes that are not the low quote.

iii. **Special Circumstance:** Evaluation of DBE quotes with tied bid items. "Tied quotes are the condition in which a subcontractor submits quotes including multiple areas of expertise across multiple work areas noting that the items and price are tied. Typically this type of quoting represents a cost saving to the prime but is not clearly stated as a discount; tied quotes are usually presented as 'all or none' quote to the prime." When non-DBE subcontractors submit tied bid items in their quotes to the prime, the DBE firms' quote may seem not competitive. In such a case, the following steps are taken in comparing the relevant quotes. These are qualitative examples.

(1) Compare bid items common to both quotes, noting the reasonableness in the price comparison.

(2) Review quotes from other firms for the bid items not quoted by the DBE firm to see if combining both can provide the same competitive advantage that the tied bid items offered.

e. After notification of contract award, submit **'Commitment to Subcontract'** form within the time period specified in the contract.

i. Provide the following information along with department form DT1202:

(1) The names, addresses, e-mail addresses, telephone numbers of DBE's contacted. The dates of both initial and follow-up contact. A printed copy of SBN solicitation is acceptable.

(2) A description of information provided to the DBE's regarding the plans, specifications, and estimated quantities for portions of the work to be performed by that DBE.

(3) Photocopies or electronic copies of all written solicitations to DBE's.

(4) Documentation of each quote received from a DBE and, if rejected, the reason for that rejection.

(5) Bidder attendance at any pre-solicitation or pre-bid meetings the department held to inform DBE's of participation opportunities available on the project.

f. The department's DBE Support Services Office is available by phone, email or in writing to request assistance in meeting the DBE goal:

DBE Support Services Office
6150 Fond du Lac Ave.
Milwaukee, WI 53218
Phone: 414-438-4583 / 608-266-6961
Fax: 414-438-5392
E-mail: DOTDBESupportServices@dot.wi.gov

6. Bidder's Appeal Process

a. A bidder can appeal the department's decision to deny the bidder's good faith waiver request. The bidder must provide written documentation refuting the specific reasons for rejection as stated in the department's rejection notice. The bidder may meet in person with the department if so

requested. Failure to appeal within 7 calendar days after receiving the department's written notice of rejection of a good faith waiver request under constitutes a forfeiture of the bidder's right of appeal. If the bidder does not appeal, the department may declare the bid ineligible for execution.

b. The department will appoint a representative, who did not participate in the original determination, to assess the bidder's appeal. The department will issue a written decision within 7 calendar days after the bidder presents all written and oral testimony. In that written decision, the department will explain the basis for finding that the bidder did or did not meet the contract DBE goal or make an adequate good faith effort to meet the contract DBE goal. The department's decision is final. If the department finds that the bidder did not meet the contract DBE goal or did not make adequate efforts to meet the DBE goal, the department may declare the bid ineligible for execution.

7. Department's Criteria for DBE Participation

Department's DBE List

a. The department maintains a DBE list on the department's website at

http://app.mylcm.com/wisdot/Reports/WisDotUCPDirectory.aspx

b. The DBE office is also available to assist at 414-438-4583 or 608-266-6961.

8. Counting DBE Participation

Assessing DBE Work

a. The department will only count the DBE usage towards the contract DBE goal if the DBE firm is certified as a DBE by one of the unified certification program agencies. If a firm becomes DBE certified before entering into a subcontract, the department may consider that DBE usage towards the contract goal. The department only counts the value of the work a DBE actually performs towards the DBE goal. The department assesses the DBE work as follows:

b. The department counts work performed by the DBE's own resources. The department includes the cost of materials and supplies the DBE obtains for the work. The department also includes the cost of equipment the DBE leases for the work. The department will not include the cost of materials, supplies, or equipment the DBE purchases or leases from the prime contractor or its affiliate, except the department will count non-project specific leases the DBE has in place before the work is advertised.

c. The department counts fees and commissions the DBE charges for providing a bona fide professional, technical, consultant, or managerial services. The department also counts fees and commissions the DBE charges for providing bonds or insurance. The department will only count costs the engineer deems reasonable based on experience or prevailing market rates.

d. If a DBE subcontracts work, the department counts the value of the subcontracted work only if the DBE's subcontractor is also a DBE.

e. The contractor shall maintain records and may be required to furnish periodic reports documenting its performance under this item.

f. It is the prime contractor’s responsibility to determine the DBE's ability to perform the work with the use of the UCP directory.

9. Commercially Useful Function

a. The department counts expenditures of a DBE toward the DBE goal only if the DBE is performing a commercially useful function on that contract.

b. A DBE is performing a commercially useful function if the following conditions are met:

c. For contract work, the DBE is responsible for executing a distinct portion of the contract work and it is carrying out its responsibilities by actually performing, managing, and supervising that work.

d. For materials and supplies, the DBE is responsible for negotiating price, determining quality and quantity, ordering, and paying for those materials and supplies.

10. Trucking

All bidders are expected to adhere to the department's current trucking policy posted on the HCCI website at

http://www.dot.wisconsin.gov/business/engrserv/docs/dbe-trucking-notice.pdf

11. Manufacturers and Suppliers

The department counts material and supplies a DBE provides under the contract. The department will give full credit toward the DBE goal if the DBE is a manufacturer of those materials or supplies. The department will give 60 percent credit toward the DBE goal if the DBE is merely a supplier of those materials or supplies. It is the bidder's responsibility to find out if the DBE is considered a supplier or a manufacturer before listing them on Commitment to Subcontract to DBE form DT1506.

12. DBE Prime

If the prime contractor is a DBE, the department will only count the work the contractor performs with its own forces, the work DBE subcontractors perform, and the work DBE suppliers or manufacturers perform.

13. Joint Venture

If a DBE performs as a participant in a joint venture, the department will only count that portion of the total dollar value of the contract equal to that portion of the work that the DBE performs with its own forces.

14. Mentor Protégé

a. If a DBE performs as a participant in a mentor protégé agreement, the department will credit the portion of the work performed by the DBE protégé firm

b. On every other project that the mentor protégé team identifies itself on.

c. For no more than one half of the total contracted DBE goal on any WisDOT project.

15. DBE Replacement

In the event a Prime Contractor needs to replace a DBE firm originally listed on the approved DBE Commitment Form DT1506, the Prime Contractor must comply with the department's DBE Replacement Policy located on the DBE page on the following web site:

http://www.dot.wisconsin.gov/business/engrserv/docs/policyreplacingdbe.pdf

16. Changes to the approved DBE Commitment Form DT1506

If there are any changes to the approved Commitment to Subcontract to DBE Form DT1506, the prime contractor must submit a revised DBE Commitment Form DT1506 and relevant attachment A(s) to the DBE Programs Office within 5 business days.

17. Contract Modifications

When additional opportunity is available by contract modifications, the Prime Contractor shall utilize DBE Subcontractors, that were committed to equal work items, in the original contract.

18. Payment

Costs for conforming to this Additional Special Provision (ASP) and any associated DBE requirements are incidental to the contract.

APPENDIX A
Sample Contractor Solicitation Letter Page 1
This sample is provided as a guide not a requirement

GFW SAMPLE MEMORANDUM

TO: DBE FIRMS

FROM: POTENTIAL PRIME CONTRACTOR OR MAJOR SUBCONTRACTOR

SUBJECT: **REQUEST FOR DBE QUOTES**

LET DATE & TIME

DATE: MONTH DAY YEAR

CC: DBE OFFICE ENGINEER

Our company is considering bidding on the projects indicated on the next page, as a prime and/or a subcontractor for the Wisconsin Department of Transportation Month- date -year Letting. Page 2 lists the projects and work items that we may subcontract for this letting. We are interested in obtaining subcontractor quotes for these projects and work categories. Also note that we are willing to accept quotes in areas we may be planning to perform ourselves as required by federal rules.

Please review page 2, respond whether you plan to quote, highlight the projects and work items you are interested in performing and return it via fax or email within 3 days. Plans, specifications and addenda are available through WisDOT at the DBE Support Services office or at the Highway Construction Contract Information (HCCI) site at http://roadwaystandards.dot.wi.gov/hcci/

Your quote should include all of the costs required to complete the items you propose to perform including labor, equipment, material, and related bonding or insurance. The quote should note items that you are DBE certified to perform, tied items, and any special terms. Page 2, with the indicated projects and items you plan to quote, should be used as a cover sheet for your quote.

Please make every effort to have your quotes into our office by time deadline the prior to the letting date. ***Make sure the correct letting date, project ID and proposal number, unit price and extension are included in your quote.*** We prefer quotes be sent via SBN but prime's alternative's are acceptable. Our office hours are include hours and days. Please call our office as soon as possible prior to the letting if you need information/clarification to prepare your quote at contact number.

If you wish to discuss or evaluate your quote in more detail, contact us after the contract is awarded. Status of the contract can be checked at WisDOT's HCCI site at http://roadwaystandards.dot.wi.gov/hcci/

All questions should be directed to:

Project Manager, John Doe,
Phone: (000) 123-4567
Email: Joe@joetheplumber.com
Fax: (000) 123- 4657

Sample Contractor Solicitation Letter Page 2

This sample is provided as a guide not a requirement

REQUEST FOR QUOTATION

Prime's Name: _____

Letting Date: _____

Project ID: _____

Please check all that apply

- ☐ Yes, we will be quoting on the projects and items listed below
- ☐ No, we are not interested in quoting on the letting or its items referenced below
- ☐ Please take our name off your monthly DBE contact list
- ☐ We have questions about quoting this letting. Please have some one contact me at this number

Prime Contractor 's Contact Person		DBE Contractor Contact Person	
Phone:		Phone	
Fax:		Fax	
Email:		Email	

Please circle the jobs and items you will be quoting below

Proposal No.	1	2	3	4	5	6	7
County							

WORK DESCRIPTION:

Clear and Grub	X		X	X		X	X
Dump Truck Hauling	X		X	X		X	X
Curb & Gutter/Sidewalk, Etc.	X		X	X		X	X
Erosion Control Items	X		X	X		X	X
Signs and Posts/Markers	X		X	X		X	X
Traffic Control		X	X	X		X	X
Electrical Work/Traffic Signals		X	X	X		X	
Pavement Marking		X	X	X	X	X	X
Sawing Pavement		X	X	X	X	X	X
QMP, Base	X	X		X	X	X	X
Pipe Underdrain	X			X			
Beam Guard				X	X	X	X
Concrete Staining							X
Trees/Shrubs	X						X

Again please make every effort to have your quotes into our office by time deadline prior to the letting date.

We prefer quotes be sent via SBN but prime's preferred alternative's are acceptable.

If there are further questions please direct them to the prime contractor's contact person at phone number.

APPENDIX B
BEST PRACTICES FOR PRIME CONTRACTOR & DBE SUBCONTRACTOR GOOD FAITH EFFORT

This list is not a set of requirements; it is a list of potential strategies

Primes

- Prime contractor open houses inviting DBE firms to see the bid "war room" or providing technical assistance
- Participate in speed networking and mosaic exercises as arranged by DBE office
- Host information sessions not directly associated with a bid letting;
- Participate in a formal mentor protégé or joint venture with a DBE firm
- Participate in WisDOT advisory committees i.e. TRANSAC, or Mega Project committee meetings
- Facilitate a small group DBE 'training session' Clarifying how your firm prepares for bid letting, evaluates subcontractors, preferred qualifications and communication methods
- Encourage subcontractors to solicit and highlight DBE participation in their quotes to you
- Quality of communication, not quantity creates the best results. Contractors should do as thorough a job as possible in communicating with DBE firms before the bid and provide any assistance requested to assure best possible bid.

DBE

- DBE firms should contact primes as soon as possible with questions regarding their quotes or bid; seven days prior is optimal.
- Continually check for contract addendums on the HCCI website through the Thursday prior to letting to stay abreast of changes.
- Review the status of contracts on the HCCI website reviewing the 'apparent low bidder' list, and bid tabs at a minimum.
- Prepare a portfolio or list of related projects and prime and supplier references; be sure to note transportation-related projects of similar size and scope, firm expertise and staffing.
- Participate in DBE office assessment programs
- Participate on advisory and mega-project committees
- Sign up to receive the DBE Contracting Update
- Consider membership in relevant industry or contractor organizations
- Active participation is a must. Quote as many projects as you can reasonably work on; quoting the primes and bidding as a prime with the department are the only ways to get work.

APPENDIX C
Types of Efforts considered in determining GFE
This list represents concepts being assessed; analysis requires additional steps

1. Whether the contractor attended any pre-solicitation or pre-bid meetings that were scheduled by WisDOT to inform DBEs of contracting and subcontracting opportunities;
2. Whether the contractor provided written notice to a reasonable number of specific DBEs that their interest in the contract was being solicited, in sufficient time to allow the DBEs to participate effectively;
3. Whether the contractor followed up initial solicitations of interest by contacting DBEs to determine if the DBEs were interested; returned the phone calls of interested DBE firms.
4. Whether the contractor selected portions of the work to be performed by DBEs in order to increase the likelihood of meeting the DBE goal;
5. Whether the contractor provided interested DBEs with adequate information about the plans, specifications and requirements of the contract;
6. Whether the contractor negotiated in good faith with interested DBEs, not rejected DBEs as unqualified without sound reasons based on a thorough investigation of their capabilities;
7. Whether the contractor made efforts to assist interested DBEs in being more competitive.
8. Whether the contractor effectively used the services of available minority community organizations: minority contractors groups, local, state, and Federal minority business assistance offices, and other organizations that provide assistance to small businesses and DBE firms.
9. Whether Prime used CRCS to identify DBE who specialize in relevant work areas.
10. Whether the contractor used available resources including contacting the DBE office, using WisDOT's website
11. Whether the contractor returned calls of firms expressing interest in a timely manner.

APPENDIX D
Good Faith Effort Evaluation Guidance
Excerpt from Appendix A of 49 CFR Part 26

APPENDIX A TO PART 26 -- GUIDANCE CONCERNING GOOD FAITH EFFORTS

I. When, as a recipient, you establish a contract goal on a DOT assisted contract, a bidder must, in order to be responsible and/or responsive, make good faith efforts to meet the goal. The bidder can meet this requirement in either of two ways. First, the bidder can meet the goal, documenting commitments for participation by DBE firms sufficient for this purpose. Second, even if it doesn't meet the goal, the bidder can document adequate good faith efforts. This means that the bidder must show that it took all necessary and reasonable steps to achieve a DBE goal or other requirement of this part which, by their scope, intensity, and appropriateness to the objective, could reasonably be expected to obtain sufficient DBE participation, even if they were not fully successful.

II. In any situation in which you have established a contract goal, part 26 requires you to use the good faith efforts mechanism of this part. As a recipient, it is up to you to make a fair and reasonable judgment whether a bidder that did not meet the goal made adequate good faith efforts. It is important for you to consider the quality, quantity, and intensity of the different kinds of efforts that the bidder has made. The efforts employed by the bidder should be those that one could reasonably expect a bidder to take if the bidder were actively and aggressively trying to obtain DBE participation sufficient to meet the DBE contract goal. Mere pro forma efforts are not good faith efforts to meet the DBE contract requirements. We emphasize, however, that your determination concerning the sufficiency of the firm's good faith efforts is a judgment call: meeting quantitative formulas is not required.

III. The Department also strongly cautions you against requiring that a bidder meet a contract goal (i.e., obtain a specified amount of DBE participation) in order to be awarded a contract, even though the bidder makes an adequate good faith efforts showing. This rule specifically prohibits you from ignoring bona fide good faith efforts.

IV. The following is a list of types of actions which you should consider as part of the bidder's good faith efforts to obtain DBE participation. It is not intended to be a mandatory checklist, nor is it intended to be exclusive or exhaustive. Other factors or types of efforts may be relevant in appropriate cases.

A. Soliciting through all reasonable and available means (e.g. attendance at pre-bid meetings, advertising and/or written notices) the interest of all certified DBEs who have the capability to perform the work of the contract. The bidder must solicit this interest within sufficient time to allow the DBEs to respond to the solicitation. The bidder must determine with certainty if the DBEs are interested by taking appropriate steps to follow up initial solicitations.

B. Selecting portions of the work to be performed by DBEs in order to increase the likelihood that the DBE goals will be achieved. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise prefer to perform these work items with its own forces.

C. Providing interested DBEs with adequate information about the plans, specifications, and requirements of the contract in a timely manner to assist them in responding to a solicitation.

D. (1) Negotiating in good faith with interested DBEs. It is the bidder's responsibility to make a portion of the work available to DBE subcontractors and suppliers and to select those portions of the work or material needs consistent with the available DBE subcontractors and suppliers, so as to facilitate DBE participation. Evidence of such negotiation includes the names, addresses, and telephone numbers of DBEs that were considered; a description of the information provided regarding the plans and specifications for the work selected for subcontracting; and evidence as to why additional agreements could not be reached for DBEs to perform the work.

(2) A bidder using good business judgment would consider a number of factors in negotiating with subcontractors, including DBE subcontractors, and would take a firm's price and capabilities as well as contract goals into consideration. However, the fact that there may be some additional costs involved in finding and using DBEs is not in itself sufficient reason for a bidder's failure to meet the contract DBE goal, as long as such costs are reasonable. Also, the ability or desire of a prime contractor to perform the work of a contract with its own organization does not relieve the bidder of the responsibility to make good faith efforts. Prime contractors are not, however, required to accept higher quotes from DBEs if the price difference is excessive or unreasonable.

E. Not rejecting DBEs as being unqualified without sound reasons based on a thorough investigation of their capabilities. The contractor's standing within its industry, membership in specific groups, organizations, or associations and political or social affiliations (for example union vs. non-union employee status) are not legitimate causes for the rejection or non solicitation of bids in the contractor's efforts to meet the project goal.

F. Making efforts to assist interested DBEs in obtaining bonding, lines of credit, or insurance as required by the recipient or contractor.

G. Making efforts to assist interested DBEs in obtaining necessary equipment, supplies, materials, or related assistance or services.

H. Effectively using the services of available minority/women community organizations; minority/women contractors' groups; local, state, and Federal minority/women business assistance offices; and other organizations as allowed on a case-by-case basis to provide assistance in the recruitment and placement of DBEs.

V. In determining whether a bidder has made good faith efforts, you may take into account the performance of other bidders in meeting the contract. For example, when the apparent successful bidder fails to meet the contract goal, but others meet it, you may reasonably raise the question of whether, with additional reasonable efforts, the apparent successful bidder could have met the goal. If the apparent successful bidder fails to meet the goal, but meets or exceeds the average DBE participation obtained by other bidders, you may view this, in conjunction with other factors, as evidence of the apparent successful bidder having made good faith efforts.

Appendix E
Small Business Network [SBN] Overview

The Small Business Network is a part of the Bid Express® service that was created to ensure that prime bidders have a centralized online location to find subs - including small and disadvantaged business enterprises (DBEs). It is available for prime bidders to use as part of their Basic Service subscription. Within the Small Business Network, **Prime Contractors** can:

1. Easily select proposals, work types and items:
    a. After adding applicable work types, select items that you wish to quote. Enter the sub-quote quantities and add comments, if desired. Adding or removing items and work types can be done quickly. If needed, you can save the sub-quote for completion at a later time.
2. Create sub-quotes for the subcontracting community:
    a. Create sub-quotes with ease using the intuitive sub-quote creator. In seven short steps, you can rapidly create a custom sub-quote directed to all subcontractors that bid on the applicable work types. Steps include: provide contact information and sub-quote expiration date, select letting and proposal, add work types and items, specify terms and conditions, upload attachments, and select vendors.
    b. Create a sub-quote to send to subcontractors or suppliers that lists the items in a proposal that you want quoted
    c. Create an unlimited number of sub-quotes for items you want quoted, and optionally mark them as a DBE-preferred request
    d. Add attachments to sub-quotes
3. View sub-quote requests & responses:
    a. After logging into the Bid Express service, you can quickly review all of your sub-quote requests and all unsolicited sub-quote requests from subcontractors. To simplify the Small Business Network home screen, sub-quote requests can be hidden with one click if they are not applicable.
    b. View or receive unsolicited sub-quotes that subcontractors have posted, complete with terms, conditions and pricing
4. View Record of Subcontractor Outreach Effort:
    a. For each sub-quote produced, a *Record of Subcontractor Outreach Effort* is generated that shows the response statistics for a particular sub-quote. If accepted by the letting agency, this report may serve as proof of a "Good Faith" effort in reaching out to the DBE community.
    b. Easily locate pre-qualified and certified small and disadvantaged businesses
    c. Advertise to small and disadvantaged businesses more efficiently and cost effectively
    d. Document your interactions with subs/DBEs by producing an Outreach Report (may be accepted as proof of DBE outreach at the discretion of each agency)

The Small Business Network is a part of the Bid Express® service that was created to ensure that small businesses have a centralized area to access information about upcoming projects. It can help small businesses learn more about opportunities, compete more effectively, network with other contractors and subcontractors, and win more jobs.

1. View and reply to sub-quote requests from primes:
    a. After logging into the Bid Express service, you can quickly review all incoming sub-quote requests and all unsolicited sub-quotes created by your company. Receive notifications by selected work type. To simplify on the Small Business Network home screen, sub-quote requests can be filtered by work types relevant to your interests, or hidden with one click if they are not applicable.
2. Select items when responding to sub-quote requests from primes:
    a. You have the freedom to choose and price any number of items when responding to a sub-quote request. Quantities can be modified, and per-item comments are also available.
    b. View requests for sub-quotes for work that primes have posted for projects they are bidding, add your pricing, terms, and conditions, and submit completed sub-quotes to the requesting primes
    c. Add attachments to a sub-quote
3. Create and send unsolicited sub-quotes to specific contractors:
    a. Create unsolicited sub-quotes with ease using the intuitive sub-quote creator. In eight short steps, you can rapidly create a custom sub-quote directed at any number of specific vendors of your choosing. Steps include: provide contact information and sub-quote expiration date, select letting and proposal, add work types and items, specify terms and conditions, upload attachments, and select vendors.
4. Easily select and price items for unsolicited sub-quotes:
    a. After adding applicable work types, select items that you wish to quote. The extended price calculates automatically, cutting out costly calculation errors. Comments can be provided on an per-item basis as well.
    b. Create an unsolicited sub-quote that lists the items from a proposal that you want to quote, include pricing, terms and conditions, and send it to selected prime/plan holder
    c. Add attachments to a sub-quote
    d. Add unsolicited work items to sub-quotes that you are responding to
5. Easy Access to Valuable Information
    a. Receive a confirmation that your sub-quote was opened by a prime
    b. View Bid Tab Analysis data from past bids, including the high, average and low prices of items.
    c. View important notices and publications from DOT targeted to small and disadvantaged businesses
6. Accessing Small Business Network for WisDOT contracting opportunities
    a. If you are a contractor not yet subscribing to the Bid Express service, go to **www.bidx.com** and select "Order Bid Express." The Small Business Network is a part of the Bid Express Basic Service.
    b. DBE firms can request a Bid Express Small Business Network Account at no cost by calling 414-438-4588

ADDITIONAL SPECIAL PROVISION 4

Payment to all Subcontractors. Within 10 calendar days of receipt by a contractor of a progress payment for work performed, materials furnished, or materials stockpiled by a subcontractor, the contractor shall pay that subcontractor for all work satisfactorily performed and for all materials furnished or stockpiled.

The contractor agrees further to release retainage amounts to each subcontractor within 10 calendar days after the subcontractor's work is satisfactorily completed. In addition, whenever the Department reduces the contract retainage amount, within 10 calendar days of receipt by a contractor of a retainage payment, the contractor must reduce the total amount retained from subcontractors to no more than remains retained by the Department.

The contractor shall pay the subcontractor within the time frames described above unless the contractor complies with both of the following within 10 calendar days of receiving the Department's progress payment:

1) The contractor notifies the subcontractor in writing that the work is not satisfactorily completed.
2) The contractor requests approval from the Department to delay payment because the subcontractor has not satisfactorily completed the work.

The contractor's request for approval should include the written notification to the subcontractor and shall provide sufficient documentation of good cause to assist the engineer in making a timely decision. If the engineer does not grant approval, the contractor shall pay the subcontractor within 10 calendar days of the Department's decision.

All subcontracting agreements made by a contractor shall include the above provisions and shall be binding on all contractors and subcontractors.

The contractor certifies compliance with the requirements of this Additional Special Provision by signing the contract. This clause applies to both DBE and non-DBE subcontractors.

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
209.0100	Backfill Granular	CY	0.23
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 $2.90 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 2013 edition of the standard specifications:

106.3.4.3.1 General

Replace paragraph two with the following effective with the November 2012 letting:

(2) Required sampling and testing methodologies and documentation are specified in CMM chapter 8.

(3) If disputed, approval of materials and components, as well as acceptance of the work incorporating those materials or components, is subject to review under the QMP dispute resolution process.

107.17.3 Railroad Insurance Requirements

Replace the entire text with the following effective with the August 2012 letting:

(1) If required by the special provisions, provide or arrange for a subcontractor to provide railroad protective liability insurance in addition to the types and limits of insurance required in 107.26. Keep railroad protective liability insurance coverage in force until completing all work, under or incidental to the contract, on the railroad right of way or premises of the railroad and until the department has accepted the work as specified in 105.11.2.4.

(2) Provide railroad protective liability insurance coverage written as specified in 23 CFR part 646 subpart A. Provide a separate policy for each railroad owning tracks on the project. Ensure that the railroad protective liability insurance policies provide the following minimum limits of coverage:

1. Coverage A, bodily injury liability and property damage liability; $2 million per occurrence.
2. Coverage B, physical damage to property liability; $2 million per occurrence.
3. An annual aggregate amount of $6 million that shall apply separately to each policy renewal or extension.

(3) Obtain coverage from insurance companies licensed to do business in Wisconsin that have an A.M. Best rating of A- or better. The cost of providing the required insurance coverage and limits is incidental to the contract. The department will make no additional or special payment for providing insurance.

(4) Submit the following to each railroad owning tracks on the project as evidence of that railroad's respective coverage:

1. A certificate of insurance for the types and limits of insurance specified in 107.26.
2. The railroad protective liability insurance policy or other acceptable documentation to the railroad company.

(5) Submit the following to the region as evidence of the required coverage:

1. A copy of the letter to the railroad company transmitting the submittal documents specified in 107.17.3(4).
2. A certificate of insurance for the required railroad protective liability coverages.

(6) Do not begin work on the right of way or premises of the railroad company until the region receives the submittals specified in 107.17.3(5) and notification from the railroad company that the contractor has provided sufficient insurance information to begin work.

(7) Notify the railroad and the region immediately upon cancellation or initiating cancellation, whichever is earlier, or any material change in coverage. Cease operations within 50 feet of the railroad right of way immediately if insurance is cancelled or reduced. Do not resume operations until the required coverage is in force.

460.2.8.3.1.4 Department Verification Testing Requirements

Replace paragraph four with the following effective with the December 2012 letting:

(4) The department will randomly test each design mixture at the following minimum frequency:

FOR TONNAGES TOTALING:	
Less than 501 tons	no tests required
From 501 to 5,000 tons	one test
More than 5,000 tons	add one test for each additional 5,000-ton increment

501.2.1 Portland Cement

Replace paragraph one with the following effective with the March 2013 letting:

(1) Use cement conforming to ASTM specifications as follows:

- Type I portland cement; ASTM C150.
- Type II portland cement; ASTM C150.
- Type III portland cement; ASTM C150, for high early strength.
- Type IP portland-pozzolan cement; ASTM C595, except maximum loss on ignition is 2.0 percent.
- Type IS portland blast-furnace slag cement; ASTM C595.
- Type IL portland-limestone cement; ASTM C595, except maximum nominal limestone content is 10 percent with no individual test result exceeding 12.0 percent.

501.2.5.5 Sampling and Testing

Replace the entire text with the following effective with the January 2013 letting:

(1) Sample and test aggregates for concrete according to the following:

Sampling aggregates	AASHTO T2
Lightweight pieces in aggregate	AASHTO T113
Material finer than No. 200 sieve	AASHTO T11
Unit weight of aggregate	AASHTO T19
Organic impurities in sands	AASHTO T21
Sieve analysis of aggregates	AASHTO T27
Effect of organic impurities in fine aggregate	AASHTO T71
Los Angeles abrasion of coarse aggregate	AASHTO T96
Freeze-thaw soundness of coarse aggregate	AASHTO T103
Sodium sulfate soundness of aggregates	AASHTO T104
Specific gravity and absorption of fine aggregate	AASHTO T84
Specific gravity and absorption of coarse aggregate	AASHTO T85
Flat & elongated pieces based on a 3:1 ratio	ASTM D4791[1]
Sampling fresh concrete	AASHTO R60
Making and curing concrete compressive strength test specimens	AASHTO T23
Compressive strength of molded concrete cylinders	AASHTO T22

[1] As modified in CMM 8-60.

501.2.6 Fly Ash

Replace paragraph three with the following effective with the March 2013 letting:

(3) Test fly ash using a recognized laboratory, as defined in 501.2.2(1), starting at least 30 days before its proposed use, and continuing at ASTM-required frequencies as the work progresses. The manufacturer shall test the chemical and physical properties listed in tables 1 and 2 of ASTM C618 at the frequencies and by the test methods prescribed in ASTM C311.

501.3.1.1.1 Air-Entrained Concrete

Replace paragraph one with the following effective with the March 2013 letting:

(1) Prepare air-entrained concrete with type I, IL, II, IS, or IP portland cement and sufficient air-entraining admixture to produce concrete with the air content specified in 501.3.2.4.

503.2.2 Concrete

Replace paragraph five with the following effective with the March 2013 letting:

(5) Furnish prestressed concrete members cast from air-entrained concrete, except I-type girders may use non-air-entrained concrete. Use type I, IL, IS, , IP, II, or III portland cement. The contractor may replace up to 30 percent of type I, IL, II, or III portland cement with an equal weight of fly ash, slag, or a combination of fly ash and slag, except for prestressed box girders and slabs, the contractor shall replace 20-30 percent of the cement with fly ash, slag, or a combination of fly ash and slag. Ensure that fly ash conforms to 501.2.6 and slag conforms to 501.2.7. Use only one source and replacement rate for work under a single bid item. Use a department-approved air-entraining admixture conforming to 501.2.2 for air-entrained concrete. Use only size No. 1 coarse aggregate conforming to 501.2.5.4.

506.3.22 Shop Inspection

Replace paragraph one with the following effective with the July 2010 letting:

(1) The engineer or an independent inspection agency under department contract may inspect all structural steel and miscellaneous metals furnished. The department will provide the contractor with monthly consultant inspection invoices and identify any quality deficiencies at the fabrication facility.

506.5 Payment

Add paragraph nine as follows effective with the June 2010 letting:

(9) The department will limit costs for inspections conducted under 506.3.2 to $0.05 per pound of material and deduct costs in excess of that amount from payment due the contractor. The department will determine costs for in-house inspections based on hourly rates for department staff plus overhead and use invoiced costs for contracted-out inspections. The department will administer deductions for the contractor's share of the total inspection cost under the Excess Costs For Fabrication Shop Inspection administrative item.

507.2.2.1 General

Replace paragraph four with the following effective with the December 2012 letting:

(4) Ensure that there are no unsound knots or knot holes. Also ensure that there are no tight knots of a diameter exceeding one-quarter of the greater dimension at the point where they occur. Measure a knot by taking its diameter at right angles to the length of the timber. Ensure that the sum of sizes of all knots in any one-foot length does not exceed 2 times the size of the largest allowed single knot. The engineer will treat cluster knots as if they were a single knot. A cluster knot is 2 or more knots grouped together, with the fibers of the wood deflected around the entire unit.

512.3.1 Driving and Cutting Off

Replace the entire text with the following effective with the December 2012 letting:

512.3.1.1 General

(1) Coordinate driving operations to prevent damage or displacement of concrete in substructure units or damage to adjacent facilities due to vibrations.

(2) Drive sheeting with a variation of 1/4 inch or less per foot from the vertical or from the batter the plans show. Ensure that the sheetpiles are within 6 inches of the plan position after driving. Do not damage sheetpiles attempting to correct for misalignment.

(3) Remove and replace, or otherwise correct, sheetpiles the engineer deems unacceptable under 105.3. Submit details of planned corrections to the engineer for review and approval before initiating any corrective actions.

(4) Drive sheetpiles to or beyond the required tip elevation the plans show.

512.3.1.2 Driving System

(1) Furnish a sheetpile driving system capable of driving the sheetpiles to the required minimum tip elevation the plans show.

(2) The engineer may order the contractor to remove a pile driving system component from service if it causes insufficient energy transfer or damages the sheetpiles. Do not return a component to service until the engineer determines that it has been satisfactorily repaired or adjusted.

(3) Drive sheetpiles with diesel, air, steam, gravity, hydraulic, or vibratory hammers.

512.3.1.3 Cut-Offs

(1) Cut off sheetpiles at the elevations the plans show or as the engineer directs. Pile cut-offs become the property of the contractor. Dispose of cut-offs not incorporated into the work.

518.2.1 General

Replace paragraph one with the following effective with the March 2013 letting:

(1) Furnish portland cement and water as specified in 501.2. Unless the engineer allows an alternate, use either type I, IL, IS, , or IP portland cement.

526.3.3 Temporary Structures

Replace paragraphs two through four with the following effective with the January 2013 letting:

(2) Inspect temporary structures conforming to the National Bridge Inspection Standards (NBIS) and the department's structure inspection manual before opening to traffic. Perform additional inspections, as the department's structure inspection manual requires, based on structure type and time in service. Submit inspection reports on department form DT2007 to the engineer and electronic copies to the department's bureau of structures maintenance section. Ensure that a department-certified active team leader, listed online in the department's highway structures information system (HSIS), performs the inspections.

(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 203.3.4. Contractor-furnished materials remain the contractor's property upon removal.

614.2.5 Wood Posts and Offset Blocks

Retitle and replace the entire text with the following effective with the July 2012 letting:

614.2.5 Posts and Offset Blocks

614.2.5.1 Wood Posts and Offset Blocks

(1) Furnish sawed posts and offset blocks of one of the following species:

Douglas fir	Southern pine	Ponderosa pine	Jack pine	White pine
Red pine	Western hemlock	Western larch	Hem-fir	Oak

(2) Ensure that posts are the size the plans show and conform to the nominal and minimum dimensions tabulated in 507.2.2.3. The contractor does not have to surface the posts. Provide posts of the net length the plans show after setting and cut off.

(3) Use stress graded posts rated at 1200 psi f_b or higher. Determine the stress grade rating for douglas fir, western larch, and southern pine as specified in 507.2.2.4.

(4) For hem-fir, hemlock, red pine, white pine, jack pine, ponderosa pine, and oak conform to the following:

TABLE 614-1 PROPERTIES FOR WOOD POSTS AND BLOCKS

SPECIES			WESTERN HEMLOCK, HEM-FIR, RED PINE, WHITE PINE, JACK PINE, PONDEROSA PINE		OAK	
MAXIMUM SLOPE OF GRAIN			1 in 15		1 in 12	
NOMINAL WIDTH OF FACE			6"	8"	6"	8"
SHAKES, CHECKS, AND SPLITS		GREEN	1"	1 3/8"	2 3/8"	3 1/8"
		SEASONED	1 1/2"	2"	2 5/8"	3 1/2"
MAXIMUM WANE			1"	1 3/8"	1 1/8"	1 5/8"
MAXIMUM ALLOWABLE KNOTS	NARROW FACE	MIDDLE 1/3 OF LENGTH	1 3/8"	1 5/8"	2 1/8"	2 3/8"
		END[1]	2 3/4"	3 1/4"	4 1/4"	4 3/4"
		SUM IN MIDDLE 1/2 OF LENGTH[2]	11"	13"	17"	19
	WIDE FACE	EDGE KNOT N MIDDLE 1/3 OF LENGTH	1 3/8"	1 5/8"		
		EDGE KNOT AT END[1]	2 3/4" 7	3 1/4"		
		CENTERLINE	1 3/8"	1 7/8"	2 1/4"	2 7/8"
		SUM IN MIDDLE 1/2 OF LENGTH	5 1/2"	7 1/2"	9"	11 1/2"

[1] But do not exceed the maximum allowable knot on the centerline of the wide face of the same piece.

[2] But do not exceed 4 times the maximum allowable knot on the centerline of the wide face of the same piece.

(5) Pressure treat posts and offset blocks as specified in 507.2.2.6. Use one of the oil-soluble preservatives or chromated copper arsenate conforming to 507.2.3. Use the same material for offset blocks and posts and treat material used in each continuous installation with the same type of preservative.

614.2.5.2 Steel Posts

(1) Furnish steel posts conforming to AASHTO M270 Grade 36 and galvanized according to AASTHO M111.

614.2.5.3 Plastic Offset Blocks

(1) Furnish plastic offset blocks from the department's approved products list.

614.3.1 General

Replace the entire text with the following effective with the July 2012 letting:

(1) Paint the ends of cut-off galvanized posts, rail, bolts, cut or drilled surfaces of galvanized components, and areas of damaged zinc coating with 2 coats of zinc dust/zinc oxide paint. Clean the damaged and adjacent areas thoroughly before applying paint.

(2) Apply 2 coats of wood preservative to cut surfaces of wood components. Use the same preservative originally used to treat that component or use a 2-percent solution of copper naphthenate conforming to AWPA Standard P8 or P36.

614.3.2.1 Installing Posts

Replace paragraph four with the following effective with the July 2012 letting:

(4) Cut post tops to the finished elevation the plans show.

628.2.13 Rock Bags

Replace paragraph one with the following effective with the November 2012 letting:

(1) Furnish rock bags made of a porous, ultraviolet resistant, high-density polyethylene or geotextile fabric that will retain 70% of its original strength after 500 hours of exposure according to ASTM D4355 and a minimum in-place filled size of 18-inches long by 12-inches wide by 6-inches high. Ensure that the fabric conforms to the following:

TEST REQUIREMENT	METHOD	VALUE
Minimum Tensile	ASTM D4632	
Machine direction		70 lb minimum
Cross direction		40 lb minimum
Elongation	ASTM D4632	
Machine direction		20% minimum
Cross direction		10 % min
Puncture	ASTM 4833	65 lbs minimum
Minimum Apparent Opening		0.0234 inches (No. 30 sieve)
Maximum Apparent Opening		0.0787 inches (No. 10 sieve)

639.2.1 General

Replace paragraph two with the following effective with the March 2013 letting:

(2) For grout use fine aggregate conforming to 501.2.5.3 and type I, IL, IS, or IP portland cement.

649.3.1 General

Replace paragraphs three and four with the following effective with the March 2013 letting:

(3) For pavements open to all traffic, apply centerline and no-passing barrier line markings as follows:

- On intermediate pavement layers, including milled surfaces, on the same day the pavement is placed or milled.
- On the upper layer of pavement, on the same day the pavement is placed unless the contractor applies permanent marking on the same day the pavement is placed.

If weather conditions preclude same-day application, apply as soon as weather allows. Do not resume next-day construction operations until these markings are completed unless the engineer allows otherwise.

(4) If required to apply no passing zone temporary pavement marking, reference the beginning and end of all existing no-passing barrier lines. Apply temporary no-passing barrier lines at those existing locations. If the contract contains the Locating No-Passing Zones bid item, relocate the no-passing zones as specified in section 648 for permanent marking.

701.4.2 Verification Testing

Replace paragraph two with the following effective with the December 2012 letting:

(2) The department will sample randomly at locations independent of the contractor's QC tests and use separate equipment and laboratories. The department will conduct a minimum of one verification test for each 5 contractor QC tests unless specific QMP provisions specify otherwise.

715.2.3.1 Pavements

Replace paragraph two with the following effective with the March 2013 letting:

(2) Provide a minimum cement content of 565 pounds per cubic yard, except if using type I, IL, or III portland cement in a mix where the geologic composition of the coarse aggregate is primarily igneous or metamorphic materials, provide a minimum cement content of 660 pounds per cubic yard.

715.3.1.3 Department Verification Testing

Replace paragraph one with the following effective with the December 2012 letting:

(1) The department will perform verification testing as specified in 701.4.2 except as follows:

- Air content, slump, and temperature: a minimum of 1 verification test per lot.
- Compressive strength: a minimum of 1 verification test per lot.

Errata

Make the following corrections to the 2013 edition of the standard specifications:

102.12 Public Opening of Proposals

Correct 102.12(1) errata by changing htm to shtm in the web link.

(1) The department will publicly open proposals at the time and place indicated in the notice to contractors. The department will post the total bid for each proposal on the Bid Express web site beginning at 9:30 AM except as specified in 102.8. If a proposal has no total bid shown, the department will not post the bid. After verification for accuracy under 103.1, the department will post bid totals on the department's HCCI web site.

http://roadwaystandards.dot.wi.gov/hcci/bid-letting/index.shtm

107.22 Contractor's Responsibility for Utility Facilities, Property, and Services

Correct errata by eliminating references to the department. Costs are determined by statute.

(3) If the contractor damages or interrupts service, the contractor shall notify the utility promptly. Coordinate and cooperate with the utility in the repair of the facility. Determine who is responsible for repair costs according to Wisconsin statutes 66.0831 and 182.0175(2).

204.3.2.2 Removing Items

Correct errata by changing the reference from 490.3.2 to 490.3.

(5) Under the Removing Asphaltic Surface Milling bid item, remove and dispose of existing asphaltic pavement or surfacing by milling at the location and to the depth the plans show. Mill the asphaltic pavement or surfacing as specified for milling salvaged asphaltic pavement in 490.3.

501.2.9 Concrete Curing Materials.

Correct errata by changing AASHTO M171 to ASTM C171.

(4) Furnish polyethylene-coated burlap conforming to ASTM C171 for white burlap-polyethylene sheets.

506.2.6.5.2 Pad Construction

Correct errata by changing ASTM A570 to ASTM A1011.

(4) For the internal steel plates use rolled mild steel conforming to ASTM A36, or ASTM A1011 grade

512.3.3 Painting

Correct errata by changing 511.3.5 to 550.3.11.3.

(1) Paint permanent steel sheet piling as specified for painting steel piling in 550.3.11.3.

513.2.2.8 Toggle Bolts

Correct errata by changing ASTM A570 to ASTM A1011.

(1) Use toggle bolts made of steel, conforming to the plans. Make the assembly from the material specified below:

Toggle bolt and pin ..... Cold finished steel heat-treated Brinell 311-363 ASTM A354.

Toggle washer ..... Hot rolled steel ASTM A1011. Manufacturer's standard washer.

Spacer nut ..... Grade 1213, ASTM A108. Cold finished steel heat-treated ASTM A325.

660.2.1 General

Correct errata by changing section 511 to 550.

(1) Furnish materials conforming to the following:

Concrete ..... section 501

Concrete bridges ..... section 502

Luminaires ..... section 659

Steel piling ..... section 550

Steel reinforcement ..... section 505

660.3.2.3 Pile Type Foundations

Correct errata by changing section 511 to 550.

(1) Drive piles as specified in for steel piling in section 550.

701.3 Contractor Testing

Correct errata by updating AASHTO T141 to AASHTO R60 and changing AASHTO T309 to ASTM C1064.

(1) Perform contract required QC tests for samples randomly located according to CMM 8-30. Also perform other tests as necessary to control production and construction processes, and additional testing enumerated in the contractor's quality control plan or that the engineer directs. Use test methods as follows:

TABLE 701-2 TESTING STANDARDS

TEST	TEST STANDARD
Washed P 200 analysis	AASHTO T11[1]
Sieve analysis of fine and coarse aggregate	AASHTO T27[1]
Aggregate moisture	AASHTO T255[1]
Sampling freshly mixed concrete	AASHTO R60
Air content of fresh concrete	AASHTO T152[2]
Concrete slump	AASHTO T119[2]
Concrete temperature	ASTM C1064
Concrete compressive strength	AASHTO T22
Making and curing concrete cylinders	AASHTO T23
Standard moist curing for concrete cylinders	AASHTO M201

[1] As modified in CMM 8-60.

[2] As modified in CMM 8-70.

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. 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).
6. All agreements made by a contractor shall include the provisions in A(1), (2), (3), (4) and (5), and shall be binding on all first tier subcontractor relationships and all contractors and subcontractors utilizing DBE firms on the project.

B. Costs for conforming to this special provision are incidental to the contract.

ADDITIONAL SPECIAL PROVISION 9
Electronic Certified Payroll Submittal

(1) Use the department's Civil Rights Compliance System (CRCS) to submit certified payrolls electronically. Details are available online through the department's highway construction contractor information (HCCI) site on the Labor, Wages, and EEO Information page at: http://roadwaystandards.dot.wi.gov/hcci/labor-wages-eeo/index.shtm

(2) Ensure that all tiers of subcontractors, as well as all trucking firms, submit their weekly certified payrolls electronically through CRCS. These payrolls 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 training as they are about to begin payrolls. The department will provide training either in a classroom setting at one of our regional offices or by telephone. Contact Tess Mulrooney at 608-267-4489 to schedule the training.

(4) The department will reject all paper submittals of forms DT-1816 and DT-1929 for information required under this special provision. All costs for conforming to this special provision are incidental to the contract.

(5) Firms wishing to export payroll data from their computer system into CRCS should have their payroll coordinator send several sample electronic files to Tess two months before a payroll needs to be submitted. Not every contractor's payroll system is capable of producing export files. For details, see pages 17-22 of the CRCS System Background Information manual available online on the Labor, Wages, and EEO Information page at: http://roadwaystandards.dot.wi.gov/hcci/labor-wages-eeo/crc-basic-info.pdf

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. General
II. Nondiscrimination
III. Nonsegregated Facilities
IV. Davis-Bacon and Related Act Provisions
V. Contract Work Hours and Safety Standards Act Provisions
VI. Subletting or Assigning the Contract
VII. Safety: Accident Prevention
VIII. False Statements Concerning Highway Projects
IX. Implementation of Clean Air Act and Federal Water Pollution Control Act
X. Compliance with Governmentwide Suspension and Debarment Requirements
XI. Certification Regarding Use of Contract Funds for Lobbying

ATTACHMENTS

A. Employment and Materials Preference for Appalachian Development Highway System or Appalachian Local Access Road Contracts (included in Appalachian contracts only)

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under Title 23 (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services). The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in bid proposal or request for proposal documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract.

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors.

II. NONDISCRIMINATION

The provisions of this section related to 23 CFR Part 230 are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR 60, 29 CFR 1625-1627, Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR 60, and 29 CFR 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with Title 23 USC Section 140, the Rehabilitation Act of 1973, as amended (29 USC 794), and Title VI of the Civil Rights Act of 1964, as amended, and related regulations including 49 CFR Parts 21, 26 and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR 230, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal employment opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (28 CFR 35, 29 CFR 1630, 29 CFR 1625-1627, 41 CFR 60 and 49 CFR 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140 shall constitute the EEO and specific affirmative action standards for the contractor's project activities under

this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR 35 and 29 CFR 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract.

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, color, national origin, age or disability. Such action shall include: 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, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action, or who are substantially involved in such action, will be made fully cognizant of, and will implement, the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees, and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to insure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are

applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs, i.e., apprenticeship, and on-the-job training programs for the geographical area of contract performance. In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, national origin, age or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, national origin, age or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established there under. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, national origin, age or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors and suppliers and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurance Required by 49 CFR 26.13(b):

a. The requirements of 49 CFR Part 26 and the State DOT's U.S. DOT-approved DBE program are incorporated by reference.

b. The contractor or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the contracting agency deems appropriate.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women;

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project, indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor

will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more.

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size). The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. Contracting agencies may elect to apply these requirements to other projects.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages

a. All laborers and mechanics employed or working upon the site of the work, will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.d. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph 1.b. of this section) and the Davis-Bacon poster (WH–1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b.(1) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is utilized in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(3) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Wage and Hour Administrator for determination. The Wage and Hour Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or

will notify the contracting officer within the 30-day period that additional time is necessary.

(4) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs 1.b.(2) or 1.b.(3) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

c. Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

d. If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding

The contracting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor under this contract, or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the contracting agency may, after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and basic records

a. Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

b.(1) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the contracting agency. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (e.g. , the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at http://www.dol.gov/esa/whd/forms/wh347instr.htm or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the contracting agency for transmission to the State DOT, the FHWA or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the contracting agency..

(2) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(i) That the payroll for the payroll period contains the information required to be provided under §5.5 (a)(3)(ii) of Regulations, 29 CFR part 5, the appropriate information is being maintained under §5.5 (a)(3)(i) of Regulations, 29 CFR part 5, and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3;

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph 3.b.(2) of this section.

(4) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code.

c. The contractor or subcontractor shall make the records required under paragraph 3.a. of this section available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the FHWA may, after written notice to the contractor, the contracting agency or the State DOT, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and trainees

a. Apprentices (programs of the USDOL).

Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship Training, Employer and Labor Services, or with a State Apprenticeship Agency recognized by the Office, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Office of Apprenticeship Training, Employer and Labor Services or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice.

The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed.

Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination.

In the event the Office of Apprenticeship Training, Employer and Labor Services, or a State Apprenticeship Agency recognized by the Office, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

b. Trainees (programs of the USDOL).

Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration.

The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration.

Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed.

In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

c. Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

d. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeymen shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

6. Subcontracts. The contractor or subcontractor shall insert Form FHWA-1273 in any subcontracts and also require the subcontractors to include Form FHWA-1273 in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility.

a. By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

c. The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

The following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchmen and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (1.) of this section, the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (1.) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (1.) of this section.

3. Withholding for unpaid wages and liquidated damages. The FHWA or the contacting agency shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (2.) of this section.

4. Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (1.) through (4.) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (1.) through (4.) of this section.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions:

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;
(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and
(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract.

2. The contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. The contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract.

5. The 30% self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements.

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C.3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 1, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

By submission of this bid/proposal or the execution of this contract, or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, or subcontractor, as appropriate, will be deemed to have stipulated as follows:

1. That any person who is or will be utilized in the performance of this contract is not prohibited from receiving an award due to a violation of Section 508 of the Clean Water Act or Section 306 of the Clean Air Act.
2. That the contractor agrees to include or cause to be included the requirements of paragraph (1) of this Section X in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant 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 first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction.

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

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction 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 or agency entering into this transaction.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

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

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant 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 or agency may terminate this transaction for cause or default.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

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

(2) 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;

(3) 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 offenses enumerated in paragraph (a)(2) of this certification; and

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

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

2. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200)

a. By signing and submitting this proposal, the prospective lower tier is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180 and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a grantee or subgrantee of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a grantee or subgrantee of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction 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 or agency with which this transaction originated.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the Excluded Parties List System website (https://www.epls.gov/), which is compiled by the General Services Administration.

h. 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 participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant 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 or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

* * * * *

Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency.

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

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000 (49 CFR 20).

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS

This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

SEPTEMBER 2002

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (EXECUTIVE ORDER 11246)

1. The Offeror's or Bidder's attention is called to the "Employment Practices" and "Equal Opportunity Clause" set forth in the Required Contract Provisions, FHWA 1273.

2. The goals and timetables for minority and female participation expressed in percentage terms for the contractor's aggregate work force in each trade, on all construction work in the covered area, are as follows:

Goals for Minority Participation for Each Trade:

County	%	County	%	County	%
Adams	1.7	Iowa	1.7	Polk	2.2
Ashland	1.2	Iron	1.2	Portage	0.6
Barron	0.6	Jackson	0.6	Price	0.6
Bayfield	1.2	Jefferson	7.0	Racine	8.4
Brown	1.3	Juneau	0.6	Richland	1.7
Buffalo	0.6	Kenosha	3.0	Rock	3.1
Burnett	2.2	Kewaunee	1.0	Rusk	0.6
Calumet	0.9	La Crosse	0.9	St. Croix	2.9
Chippewa	0.5	Lafayette	0.5	Sauk	1.7
Clark	0.6	Langlade	0.6	Sawyer	0.6
Columbia	1.7	Lincoln	0.6	Shawano	1.0
Crawford	0.5	Manitowoc	1.0	Sheboygan	7.0
Dane	2.2	Marathon	0.6	Taylor	0.6
Dodge	7.0	Marinette	1.0	Trempealeau	0.6
Door	1.0	Marquette	1.7	Vernon	0.6
Douglas	1.0	Menominee	1.0	Vilas	0.6
Dunn	0.6	Milwaukee	8.0	Walworth	7.0
Eau Claire	0.5	Monroe	0.6	Washburn	0.6
Florence	1.0	Oconto	1.0	Washington	8.0
Fond du Lac	1.0	Oneida	0.6	Waukesha	8.0
Forest	1.0	Outagamie	0.9	Waupaca	1.0
Grant	0.5	Ozaukee	8.0	Waushara	1.0
Green	1.7	Pepin	0.6	Winnebago	0.9
Green Lake	1.0	Pierce	2.2	Wood	0.6

Goals for female participation for each trade: 6.9%

These goals are applicable to all the contractor's construction work, (whether or not it is federal or federally assisted), performed in the covered area. If the contractor performs construction work in the geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and nonfederally involved construction.

The contractor's compliance with the Executive Order and the Regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from contractor to contractor or from project to project for the sole purpose of meeting the contractor's goals shall be a violation of the contract, the Executive Order and the Regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within ten (10) working days of award of any construction subcontract in excess of $10,000.00 at any tier for construction work under the contract resulting from this solicitation. The notification shall list the name, address and telephone number of the subcontractor, employer identification number of the subcontractor; estimated dollar amount of the subcontract; estimated starting and completion dates of the subcontract; and the geographical area in which the subcontract is to be performed.

   As referred to in this section, the Director means:

   Director
   Office of Federal Contract Compliance Programs
   Ruess Federal Plaza
   310 W. Wisconsin Ave., Suite 1115
   Milwaukee, WI 53202

   The "Employer Identification Number" means the Federal Social Security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941.

4. As used in this notice, and in the contract resulting from solicitation, the "covered area" is the county(ies) in Wisconsin to which this proposal applies.

APRIL 2012

ADDITIONAL FEDERAL-AID PROVISIONS

BUY AMERICA

All steel and iron materials permanently incorporated in this project shall be domestic products and all manufacturing and coating processes for these materials 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 this 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.

Upon completion of the project certify to the engineer, in writing using department form WS4567, that all steel, iron, and coating processes for steel or iron incorporated into the contract work conform to these Buy America provisions. Attach a list of exemptions and their associated costs to the certification form. Department form WS4567 is available at:

http://roadwaystandards.dot.wi.gov/standards/forms/hidden/ws4567.doc

NOTICE TO ALL BIDDERS

To report bid rigging activities call:

1-800-424-9071

The U.S. Department of Transportation (DOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., Eastern Time. Anyone with knowledge of possible bid rigging, bidding collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of the DOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

Effective with September 2004 Letting

WISCONSIN DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS AND TRANSPORTATION FACILITIES

SUPPLEMENTAL REQUIRED CONTRACT PROVISIONS

I. Wage Rates, Hours of labor and payment of Wages
II. Payroll Requirements
III. Postings at the Site of the Work
IV. Affidavits
V. Wage Rate Redistribution
VI. Additional Classifications

I. WAGE RATES, HOURS OF LABOR AND PAYMENT OF WAGES

The schedule of "Minimum Wage Rates" attached hereto and made a part hereof furnishes the prevailing wage rates that have been determined pursuant to Section 103.50 of the Wisconsin Statutes. These wage rates are the minimum required to be paid to the various laborers, workers, mechanics and truck drivers employed by contractors and subcontractors on the construction work embraced by the contract and subject to prevailing hours and wages under Section 103.50, Stats. If necessary to employ laborers, workers, mechanics or truck drivers whose classification is not listed on the schedule, they shall be paid at rates conformable to those listed for similar classifications. Apprentices shall be paid at rates not less than those prescribed in their state indenture contacts.

While the wage rates shown are the minimum rates required by the contract to be paid during its life, this in not a representation that labor can be obtained at these rates. It is the responsibility of bidders to inform themselves as to the local labor conditions and prospective changes or adjustments of wage rates. No increase in the contract price shall be allowed or authorized on account of the payment of wage rates in excess of those listed herein.

Pursuant to Section 103.50 of the Wisconsin Statutes, the prevailing hours of labor have been determined to be up to 10 hours per day and 40 hours per calendar week Monday through Friday. If any laborer, worker, mechanic or truck driver is permitted or required to work more than the prevailing number of hours per day or per calendar week on this contract, they shall be paid for all hours in excess of the prevailing hours at a rate of at least one and one-half (1 1/2) times their hourly rate of pay. All work on Saturday, Sunday and the following holidays is to be paid at time and a half: (1) January 1, (2) the last Monday in May, (3) July 4, (4) the first Monday in September, (5) the fourth Thursday in November, (6) December 25, (7) the day before if January 1, July 4 or December 25 falls on a Saturday and (8) the day following if January 1, July 4 or December 25 falls on a Sunday.

All laborers, workers, mechanics and truck drivers shall be paid unconditionally not less often than once a week. Persons who own and operate their own trucks must receive the prevailing truck driver rate for the applicable type of truck (i.e. 2 axle, 3 or more axle, articulated, eculid or dumptor) he or she operates, plus an agreed upon amount for the use of his or her truck. Every owner-operator MUST be paid separately for their driving and for the use of their truck.

For those projects subject to the requirements of the Davis-Bacon Act, the Secretary of Labor will also have determined "Minimum Wage Rates" for work to be performed under the contract. These rates are, for all or most of the labor, worker, mechanic or truck driver classifications, identical to those established under Section 103.50 of the Wisconsin Statutes. In the event the rates are not identical, the higher of the two rates will govern.

II. PAYROLL REQUIREMENTS

All contractors and subcontractors must submit weekly Certified Payrolls and Compliance Statement verifying that all laborers, workers, mechanics and truck drivers working on the project have been paid the prevailing wage rates for all work performed under the contract required by Section 103.50 of the Wisconsin Statutes.

III. POSTINGS AT THE SITE OF THE WORK

In addition to the required postings furnished by the Department, the contractor shall post the following in at least one conspicuous place at the site of work:

a. "NOTICE TO EMPLOYEES," which provides information required to be posted by the provisions of Section 103.50 of the Wisconsin Statutes.

b. A copy of the State of Wisconsin Minimum Wages Rates. (Four pages.)

c. A copy of the contractor's Equal Employment Opportunity Policy.

d. On any project involving federal aid, in addition to the furnished postings, the contractor shall post a copy of the "Davis-Bacon Act, Minimum Wage Rates". (Three pages.)

IV. WAGE RATE REDISTRIBUTION

The amount specified as the hourly basic rate of pay and the amount(s) specified as the fringe benefit contribution(s), for all classes of laborers, workers, mechanics or truck drivers may be redistributed, when necessary, to conform to those specified in any applicable collective bargaining agreement, provided that both parties to such agreement

request and receive the approval for any such redistribution from both the Department of Transportation and the Department of Workforce Development prior to the implementation of such redistribution.

V. ADDITIONAL CLASSIFICATIONS

Any unlisted laborer or mechanic classification that is needed to perform work on this project, and is not included within the scope of any of the classifications listed in the application prevailing wage rate determination, may be added after award only if all of the following criteria have been met:

1. The affected employer(s) must make a written request to WisDOT Central Office to utilize the unlisted classification on this project.

2. The request must indicate the scope of the work to be performed by the unlisted classification and must indicate the proposed wage/fringe benefit package that the unlisted classification is to receive.

3. The work to be performed by the unlisted classification must not be performed by a classification that is included in the applicable prevailing wage rate determination.

4. The unlisted classification must be commonly employed in the area where the project is located.

5. The proposed wage/fringe benefit package must bear a reasonable relationship to those set forth in the applicable prevailing wage rate determination.

6. The request should be made prior to the actual performance of the work by the unlisted classification.

7. DWD must approve the use of the unlisted classification and the proposed wage/fringe benefit package. USDOL also must approve the use of the unlisted classification and the proposed wage/fringe benefit package on federal aid projects.

8. WisDOT and DWD may amend the proposed wage/fringe benefit package, as deemed necessary, and may set forth specific employment ratios and scope of work requirements in the approval document.

The approved wage/fringe benefit package shall be paid to all laborers, workers, mechanics or truck drivers performing work within the scope of that performed by the unlisted classification, from the first day on which such work is performed. In the event that work is performed by the unlisted classification prior to approval, the wage/fringe benefit package to be paid for such work must be in conformance with the wage/fringe

benefit package approved for such work. Under this arrangement a retroactive adjustment in wages and/or fringe benefits may be required to be made to the affected laborers, workers, mechanics or truck drivers by the affected employer(s).

ANNUAL PREVAILING WAGE RATE DETERMINATION
FOR ALL STATE HIGHWAY PROJECTS
ROCK COUNTY

Compiled by the State of Wisconsin - Department of Workforce Development
for the Department of Transportation
Pursuant to s. 103.50, Stats.
Issued on May 1, 2013

CLASSIFICATION: Contractors are required to call the Department of Workforce Development if there are any questions reqarding the proper trade or classification to be used for any worker on a public works project.

OVERTIME: Time and one-half must be paid for all hours worked over 10 hours per day and 40 hours per calendar week and for all hours worked on Saturday, Sunday and the following six (6) holidays: January 1; the last Monday in May; July 4; the 1st Monday in September; the 4th Thursday in November; December 25; the day before if January 1, July 4 or December 25 falls on a Saturday; the day following if January 1, July 4 or December 25 falls on a Sunday.

FUTURE INCREASE: If indicated for a specific trade or occupation, the full amount of such increase MUST be added to the "TOTAL" indicated for such trade or occupation on the date(s) such increase(s) becomes effective.

PREMIUM PAY: If indicated for a specific trade or occupation, the full amount of such pay MUST be added to the "HOURLY BASIC RATE OF PAY" indicated for such trade or occupation, whenever such pay is applicable.

SUBJOURNEY: Wage rates may be available for some of the classifications indicated below. Any employer that desires to use any subjourney classification on a project MUST request the applicable wage rate from the Department of Workforce Development PRIOR to the date such classification is used on such project. Form ERD-10880 is available for this purpose and can be obtained by writing to the Department of Workforce Development, Equal Rights Division, P.O. Box 8928, Madison, WI 53708.

TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
	$	$	$
Bricklayer, Blocklayer or Stonemason	35.58	19.20	54.78
Carpenter	30.16	15.31	45.47
Cement Finisher	32.09	16.13	48.22
Future Increase(s): Add $1.87 on 6/1/13; Add $1.87 on 6/1/14; Add $1.87 on 6/1/15; Add $1.75 on 6/1/16. Premium Pay: DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.			
Electrician	37.25	17.59	54.84
Fence Erector	28.00	4.50	32.50
Ironworker	35.00	28.90	63.90
Line Constructor (Electrical)	31.29	15.34	46.63
Painter	26.65	13.10	39.75
Pavement Marking Operator	29.22	16.82	46.04
Piledriver	30.66	15.31	45.97
Roofer or Waterproofer	29.40	18.81	48.21
Teledata Technician or Installer	21.26	11.75	33.01
Tuckpointer, Caulker or Cleaner	32.01	16.85	48.86
Underwater Diver (Except on Great Lakes)	37.45	19.45	56.90
Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	29.64	17.22	46.86
Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	35.50	15.09	50.59
Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.94	13.57	39.51
Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.08	12.96	37.04
Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	11.90	33.65

TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY	HOURLY FRINGE BENEFITS	TOTAL
	$	$	$
TRUCK DRIVERS			
Single Axle or Two Axle	33.22	18.90	52.12
Three or More Axle	23.31	17.13	40.44
Future Increase(s): Add $1.85/hr on 6/1/2013. Premium Pay: DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.			
Articulated, Euclid, Dumptor, Off Road Material Hauler	27.77	19.90	47.67
Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Pay: DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor- wages- eeo/ index. shtm.			
Pavement Marking Vehicle	23.84	14.70	38.54
Shadow or Pilot Vehicle	33.22	18.90	52.12
Truck Mechanic	22.50	16.19	38.69
LABORERS			
General Laborer	28.07	13.90	41.97
Future Increase(s): Add $1.70/hr on 6/1/2013; Add $1.60/hr on 6/1/2014. Premium Pay: Add $.10/hr for topman, air tool operator, vibrator or tamper operator (mechanical hand operated), chain saw operator and demolition burning torch laborer; Add $.15/hr for bituminous worker (raker and luteman), formsetter (curb, sidewalk and pavement) and strike off man; Add $.20/hr for blaster and powderman; Add $.25/hr for bottomman; Add $.35/hr for line and grade specialist; Add $.45/hr for pipelayer. DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).			
Asbestos Abatement Worker	18.00	0.00	18.00
Landscaper	28.07	13.90	41.97
Future Increase(s): Add $1.70/hr on 6/1/13; Add $1.60/hr on 6/1/14. Premium Pay: DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).			
Flagperson or Traffic Control Person	24.70	13.90	38.60
Future Increase(s): Add $1.70/hr on 6/1/2013; Add $1.60/hr on 6/1/2014. Premium Pay: DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.			
Fiber Optic Laborer (Outside, Other Than Concrete Encased)	17.81	12.22	30.03
Railroad Track Laborer	15.00	7.65	22.65

TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
HEAVY EQUIPMENT OPERATORS			
Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Traveling Crane (Bridge Type). Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Pay: DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor- wages- eeo/ index. shtm.	35.22	19.90	55.12
Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs., & Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Pay: DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor- wages- eeo/ index. shtm.	34.72	19.90	54.62
Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Automatic Subgrader (Concrete); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boatmen (NOT Performing Work on the Great Lakes); Boring Machine (Directional, Horizontal or Vertical); Bridge (Bidwell) Paver; Bulldozer or Endloader; Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, VIbratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane WIth a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A- Frames. Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14.	34.22	19.90	54.12

TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
Premium Pay: DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor- wages- eeo/ index. shtm.			
Belting, Burlap, Texturing Machine; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or WIthout Attachments); Telehandler; Tining or Curing Machine.	33.96	19.90	53.86
Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14.			
Premium Pay: DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor- wages- eeo/ index. shtm.			
Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Concrete Proportioning Plant; Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack.	33.67	19.90	53.57
Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14.			
Premium Pay: DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor- wages- eeo/ index. shtm.			
Fiber Optic Cable Equipment.	25.74	15.85	41.59

State of Wisconsin Department of Workforce Development Equal Rights Division	**DEPARTMENTAL ORDER**

ISSUE DATE: 3/14/2013

PROJECT:

SW REGION FIELD OFFICE RENOVATION
EDGERTON CITY, ROCK COUNTY, WI
Determination No. 201300823

PROJECT OWNER:	**REQUESTER:**
KIM SCHAUDER, PROJECT SUPERVISOR DEPARTMENT OF TRANSPORATION 2101 WRIGHT STREET MADISON, WI 53704	MARK BIRRENKOTT, PROJECT MANAGER AECOM 1350 DEMING WAY SUITE 100 MIDDLETON, WI 53562
ADDITIONAL CONTACT:	**NOTE:** The Requester must provide a copy of this Project Determination and enclosures to the Project Owner and Additional Contact.

The department received an application for prevailing wage rate determination for the above-captioned project. The department conducted a survey to determine the prevailing wage rate for the trade(s) or occupation(s) needed to complete the project. The survey's findings appear in the attached project determination.

If you believe that the wage rate for any trade or occupation does not accurately reflect the prevailing wage rate in the city, village or town where the project is located, you may ask the department to conduct an administrative review of such wage rate. You must submit this request in writing within 30 days from the date indicated above. Additionally, your request must include wage rate information from at least three similar projects in the city, village or town where the proposed project is located and on which some work has been performed by the contested trade(s) during the current survey period and was previously considered by the department in issuing the attached determination. See DWD 290.10 of the Wisconsin Administrative Code and either s. 66.0903(3)(br), s. 66.0904(4)(e), or s. 103.49(3)(c), Stats., for a complete explanation of the administrative review process.

Enclosures

It is hereby ordered that the prevailing wage rates set forth in the attached project determination shall only be applicable to the above referenced project. This order is a **FINAL ORDER** of the department unless a timely request for an administrative review is filed with the department.

ISSUED BY:

Equal Rights Division
Labor Standards Bureau
Construction Wage Standards Section
PO Box 8928 Madison, WI 53708-8928
(608)266-6861

Web Site: http://dwd.wisconsin.gov/er/

PREVAILING WAGE RATE DETERMINATION
Issued by the State of Wisconsin
Department of Workforce Development
Pursuant to s. 103.49, Wis. Stats.
Issued On: 3/14/2013

DETERMINATION NUMBER: 201300823

EXPIRATION DATE: Prime Contracts MUST Be Awarded or Negotiated On Or Before 12/31/2013. If NOT, You MUST Reapply.

PROJECT NAME: SW REGION FIELD OFFICE RENOVATION

PROJECT LOCATION: EDGERTON CITY, ROCK COUNTY, WI

CONTRACTING AGENCY: DEPARTMENT OF TRANSPORATION

CLASSIFICATION:	Contractors are responsible for correctly classifying their workers. Either call the Department of Workforce Development (DWD) with trade or classification questions or consult DWD's Dictionary of Occupational Classifications & Work Descriptions on the DWD website at: dwd.wisconsin.gov/er/prevailing_wage_rate/Dictionary/dictionary_main.htm.
OVERTIME:	Time and one-half must be paid for all hours worked: - over 10 hours per day on prevailing wage projects - over 40 hours per calendar week - Saturday and Sunday - on all of the following holidays: January 1; the last Monday in May; July 4; the 1st Monday in September; the 4th Thursday in November; December 25; - The day before if January 1, July 4 or December 25 falls on a Saturday; - The day following if January 1, July 4 or December 25 falls on a Sunday. Apply the time and one-half overtime calculation to whichever is higher between the Hourly Basic Rate listed on this project determination or the employee's regular hourly rate of pay. Add any applicable Premium or DOT Premium to the Hourly Basic Rate before calculating overtime. A DOT Premium (discussed below) may supersede this time and one-half requirement.
FUTURE INCREASE:	When a specific trade or occupation requires a future increase, you MUST add the full hourly increase to the "TOTAL" on the effective date(s) indicated for the specific trade or occupation.
PREMIUM PAY:	If indicated for a specific trade or occupation, the full amount of such pay MUST be added to the "HOURLY BASIC RATE OF PAY" indicated for such trade or occupation, whevenever such pay is applicable.
DOT PREMIUM:	This premium only applies to highway and bridge projects owned by the Wisconsin Department of Transportation and to the project type heading "Airport Pavement or State Highway Construction." DO NOT apply the premium calculation under any other project type on this determination.
APPRENTICES:	Pay apprentices a percentage of the applicable journeyperson's hourly basic rate of pay and hourly fringe benefit contributions specified in this determination. Obtain the appropriate percentage from each apprentice's contract or indenture.
SUBJOURNEY:	Subjourney wage rates may be available for some of the trades or occupations indicated below with the exception of laborers, truck drivers and heavy equipment operators. Any employer interested in using a subjourney classification on this project MUST complete Form ERD-10880 and request the applicable wage rate from the Department of Workforce Development PRIOR to using the subjourney worker on this project.

This document **MUST BE POSTED** by the **CONTRACTING AGENCY** in at least one conspicuous and easily accessible place **on the site of the project** . A local governmental unit may post this document at the place normally used to post public notices if there is no common site on the project. This document **MUST** remain posted during the entire time any worker is employed on the project and **MUST** be physically incorporated into the specifications and all contracts and subcontracts. If you have any questions, please write to the Equal Rights Division, Labor Standards Bureau, P.O. Box 8928, Madison, Wisconsin 53708 or call (608) 266-6861.

The following statutory provisions apply to state agency projects of public works and are set forth below pursuant to the requirements of s. 103.49(3)(a), Stats.

s. 103.49 (1) (c) "PREVAILING HOURS OF LABOR" for any trade or occupation in any area means 10 hours per day and 40 hours per week and may not include any hours worked on a Saturday or Sunday or on any of the following holidays:

1. January 1.
2. The last Monday in May.
3. July 4.
4. The first Monday in September.
5. The 4th Thursday in November.
6. December 25.
7. The day before if January 1, July 4 or December 25 falls on a Saturday.
8. The day following if January 1, July 4 or December 25 falls on a Sunday.

s. 103.49 (2) PREVAILING WAGE RATES AND HOURS OF LABOR.
Any contract made for the erection, construction, remodeling, repairing, or demolition of any project of public works to which the state or any state agency is a party shall contain a stipulation that no person performing the work described in sub. (2m) may be permitted to work a greater number of hours per day or per week than the prevailing hours of labor, except that any such person may be permitted or required to work more than such prevailing hours of labor per day and per week if he or she is paid for all hours worked in excess of the prevailing hours of labor at a rate of at least 1.5 times his or her hourly basic rate of pay; nor may he or she be paid less than the prevailing wage rate determined under sub. (3) in the same or most similar trade or occupation in the area in which the project of public works is situated. A reference to the prevailing wage rates determined under sub. (3) and the prevailing hours of labor shall be published in the notice issued for the purpose of securing bids for the project. If any contract or subcontract for a project of public works that is subject to this section is entered into, the prevailing wage rates determined under sub. (3) and the prevailing hours of labor shall be physically incorporated into and made a part of the contract or subcontract, except that for a minor subcontract, as determined by the department, the department shall prescribe by rule the method of notifying the minor subcontractor of the prevailing wage rates and prevailing hours of labor applicable to the minor subcontract. The prevailing wage rates and prevailing hours of labor applicable to a contract or subcontract may not be changed during the time that the contract or subcontract is in force.

s. 103.49 (6M) LIABILITY AND PENALTIES.
(ag) 1. Any contractor, subcontractor, or contractor's or subcontractor's agent who fails to pay the prevailing wage rate determined by the department under sub. (3) or who pays less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor is liable to any affected employee in the amount of his or her unpaid wages or his or her unpaid overtime compensation and in an additional amount as liquidated damages as provided in subd. 2., 3., whichever is applicable.
2. If the department determines upon inspection under sub. (5) (b) or (c) that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the department shall order the contractor to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages within a period specified by the department in the order.
3. In addition to or in lieu of recovering the liability specified in subd. 1. as provided in subd. 2., any employee for and in behalf of that employee and other employees similarly situated may commence an action to recover that liability in any court of competent jurisdiction. If the court finds that a contractor, subcontractor, or contractor's or subcontractor's agent has failed to pay the prevailing wage rate determined by the department under sub. (3) or has paid less than 1.5 times the hourly basic rate of pay for all hours worked in excess of the prevailing hours of labor, the court shall order the contractor, subcontractor, or agent to pay to any affected employee the amount of his or her unpaid wages or his or her unpaid overtime compensation and an additional amount equal to 100 percent of the amount of those unpaid wages or that unpaid overtime compensation as liquidated damages.

5. No employee may be a party plaintiff to an action under subd. 3. unless the employee consents in writing to become a party and the consent is filed in the court in which the action is brought. Notwithstanding s. 814.04 (1), the court shall, in addition to any judgment awarded to the plaintiff, allow reasonable attorney fees and costs to be paid by the defendant.
(am) Except as provided in pars. (b), (d) and (f), any contractor, subcontractor or contractor's or subcontractor's agent who violates this section may be fined not more than $200 or imprisoned for not more than 6 months or both. Each day that a violation continues is a separate offense.
(b) Whoever induces any person who seeks to be or is employed on any project of public works that is subject to this section to give up, waive, or return any part of the wages to which the person is entitled under the contract governing the project, or who reduces the hourly basic rate of pay normally paid to a person for work on a project that is not subject to this section during a week in which the person works both on a project of public works that is subject to this section and on a project that is not subject to this section, by threat not to employ, by threat of dismissal from employment, or by any other means is guilty of an offense under s. 946.15 (1).
(c) Any person employed on a project of public works that is subject to this section who knowingly permits a contractor, subcontractor, or contractor's or subcontractor's agent to pay him or her less than the prevailing wage rate set forth in the contract governing the project, who gives up, waives, or returns any part of the compensation to which he or she is entitled under the contract, or who gives up, waives, or returns any part of the compensation to which he or she is normally entitled for work on a project that is not subject to this section during a week in which the person works both on a project of public works that is subject to this section and on a project that is not subject to this section, is guilty of an offense under s. 946.15 (2).
(d) Whoever induces any person who seeks to be or is employed on any project of public works that is subject to this section to permit any part of the wages to which the person is entitled under the contract governing the project to be deducted from the person's pay is guilty of an offense under s. 946.15 (3), unless the deduction would be permitted under 29 CFR 3.5 or 3.6 from a person who is working on a project that is subject to 40 USC 3142.
(e) Any person employed on a project of public works that is subject to this section who knowingly permits any part of the wages to which he or she is entitled under the contract governing the project to be deducted from his or her pay is guilty of an offense under s. 946.15 (4), unless the deduction would be permitted under 29 CFR 3.5 or 3.6 from a person who is working on a project that is subject to 40 USC 3142.

BUILDING OR HEAVY CONSTRUCTION

Includes sheltered enclosures with walk-in access for the purpose of housing persons, employees, machinery, equipment or supplies and non-sheltered work such as canals, dams, dikes, reservoirs, storage tanks, etc. A sheltered enclosure need not be "habitable" in order to be considered a building. The installation of machinery and/or equipment, both above and below grade level, does not change a project's character as a building. On-site grading, utility work and landscaping are included within this definition. Residential buildings of four (4) stories or less, agricultural buildings, parking lots and driveways are NOT included within this definition.

SKILLED TRADES

Fringe Benefits Must Be Paid On All Hours Worked

CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
101	Acoustic Ceiling Tile Installer	30.16	15.31	45.47
102	Boilermaker	31.09	25.61	56.70
103	Bricklayer, Blocklayer or Stonemason	32.06	16.80	48.86
104	Cabinet Installer	30.16	15.31	45.47
105	Carpenter	30.16	15.31	45.47
106	Carpet Layer or Soft Floor Coverer	30.16	15.31	45.47
107	Cement Finisher	31.48	15.68	47.16
108	Drywall Taper or Finisher	29.87	18.79	48.66
109	Electrician Future Increase(s): Add $.80/hr on 6/1/2013. Add $.70/hr on 6/1/2014. Add $.25/hr on 12/1/14. Add $.80/hr on 6/1/15. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	30.00	17.81	47.81
110	Elevator Constructor	44.94	23.39	68.33
111	Fence Erector	22.50	3.65	26.15
112	Fire Sprinkler Fitter	36.07	17.07	53.14
113	Glazier	36.13	11.63	47.76
114	Heat or Frost Insulator	33.93	23.26	57.19
115	Insulator (Batt or Blown)	27.47	19.16	46.63
116	Ironworker Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sundaty, New Year's Day,Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	35.09	29.54	64.63
117	Lather	30.16	15.31	45.47

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
118	Line Constructor (Electrical)	37.05	16.94	53.99
119	Marble Finisher	20.00	0.00	20.00
120	Marble Mason	32.06	16.80	48.86
121	Metal Building Erector	22.00	1.25	23.25
122	Millwright	31.76	15.36	47.12
123	Overhead Door Installer	13.50	0.00	13.50
124	Painter	24.80	14.78	39.58
125	Pavement Marking Operator	30.00	0.00	30.00
126	Piledriver	30.66	15.31	45.97
127	Pipeline Fuser or Welder (Gas or Utility)	30.18	19.29	49.47
129	Plasterer	30.03	16.36	46.39
130	Plumber Future Increase(s): Add $1/hr on 6/1/13; Add $1/hr 6/1/14.	36.72	19.47	56.19
132	Refrigeration Mechanic	36.96	17.94	54.90
133	Roofer or Waterproofer	29.40	18.81	48.21
134	Sheet Metal Worker	32.75	21.93	54.68
135	Steamfitter	37.76	19.99	57.75
137	Teledata Technician or Installer Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	21.89	11.85	33.74
138	Temperature Control Installer	41.20	16.21	57.41
139	Terrazzo Finisher Future Increase(s): Add $ .80 on 6/1/2013	26.57	16.50	43.07
140	Terrazzo Mechanic	29.51	17.63	47.14
141	Tile Finisher Future Increase(s): Add $ .80/hr on 6/1/2013.	23.77	16.50	40.27
142	Tile Setter Future Increase(s): Add $ .80/hr on 6/1/2013.	29.71	16.50	46.21

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
143	Tuckpointer, Caulker or Cleaner Future Increase(s): Add $ .80 on 6/1/2013 Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.01	17.35	49.36
144	Underwater Diver (Except on Great Lakes)	34.16	15.31	49.47
146	Well Driller or Pump Installer Future Increase(s): Add $.20/hr on 06/01/2013.	25.32	15.45	40.77
147	Siding Installer	37.20	17.01	54.21
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	28.24	15.10	43.34
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	29.64	16.44	46.08
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.94	13.57	39.51
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.08	12.96	37.04
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	24.00	11.57	35.57

TRUCK DRIVERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
201	Single Axle or Two Axle	31.89	17.98	49.87
203	Three or More Axle	18.50	4.83	23.33
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add $1/hr on 6/2/2013.	32.39	18.46	50.85
205	Pavement Marking Vehicle	20.85	11.02	31.87
207	Truck Mechanic	18.50	4.83	23.33

LABORERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
301	General Laborer Future Increase(s): Add $.75/hr. on 06/03/2013 Premium Increase(s): Add $1.00/hr for certified welder; Add $.25/hr for mason tender	24.19	13.90	38.09
302	Asbestos Abatement Worker	18.00	0.00	18.00
303	Landscaper	15.00	2.57	17.57
310	Gas or Utility Pipeline Laborer (Other Than Sewer and Water)	20.94	12.65	33.59
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased) Premium Increase(s): DOT PREMIUMS: Pay two times the hourly basic rate on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	18.31	12.67	30.98
314	Railroad Track Laborer	15.00	7.65	22.65
315	Final Construction Clean-Up Worker	24.69	12.90	37.59

HEAVY EQUIPMENT OPERATORS
SITE PREPARATION, UTILITY OR LANDSCAPING WORK ONLY

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
501	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Milling Machine; Boring Machine (Directional, Horizontal or Vertical); Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Backhoe (Track Type) Having a Mfgr's Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Crane, Shovel, Dragline, Clamshells; Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Grader or Motor Patrol; Master Mechanic; Mechanic or Welder; Robotic Tool Carrier (With or Without Attachments); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Tractor (Scraper, Dozer, Pusher, Loader); Trencher (Wheel Type or Chain Type Having Over 8 Inch Bucket).	31.89	7.89	39.78

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
502	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Environmental Burner; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Jeep Digger; Screed (Milling Machine); Skid Rig; Straddle Carrier or Travel Lift; Stump Chipper; Trencher (Wheel Type or Chain Type Having 8 Inch Bucket & Under). Future Increase(s): Add $1/hr on 6/2/2013.	32.39	18.46	50.85
503	Air Compressor (&/or 400 CFM or Over); Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Forklift; Generator (&/or 150 KW or Over); Greaser; High Pressure Utility Locating Machine (Daylighting Machine); Mulcher; Oiler; Post Hole Digger or Driver; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	18.50	0.67	19.17
504	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	37.45	19.45	56.90
505	Work Performed on the Great Lakes Including Crane or Backhoe Operator; Assistant Hydraulic Dredge Engineer; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder; 70 Ton & Over Tug Operator. Future Increase(s): Add $2.19/hr on 01/01/2013; Add $2.00/hr on 01/01/2014. Premium Increase(s): Add $.50/hr for Friction Crane, Lattice Boom or Crane Certification (CCO).	38.80	20.17	58.97
506	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery. Future Increase(s): Add $2.08/hr on 01/01/2013; Add $2.00/hr on 01/01/2014.	34.50	20.04	54.54
507	Work Performed on the Great Lakes Including Deck Equipment Operator, Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY. Future Increase(s): Add $1.88/hr on 01/01/2013; Add $2.00/hr on 01/01/2014.	28.70	19.86	48.56

HEAVY EQUIPMENT OPERATORS
EXCLUDING SITE PREPARATION, UTILITY, PAVING LANDSCAPING WORK

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
508	Boring Machine (Directional); Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Future Increase(s): Add $1/hr on 6/2/2013. Premium Increase(s): Add $.50/hr for >200 Ton / Add $1/hr at 300 Ton / Add $1.50 at 400 Ton / Add $2/hr at 500 Ton & Over.	35.12	18.46	53.58
509	Backhoe (Track Type) Having a Mfgr's Rated Capacity of 130,000 Lbs. or Over; Boring Machine (Horizontal or Vertical); Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With A Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Pile Driver; Versi Lifts, Tri-Lifts & Gantrys (20,000 Lbs. & Over). Future Increase(s): Add $1/hr on 6/2/2013. Premium Increase(s): Add $.25/hr for all >45 Ton lifting capacity cranes.	34.12	18.46	52.58
510	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Dredge (NOT Performing Work on the Great Lakes); Forklift (Machinery Moving or Steel Erection, 25 Ft & Over); Gradall (Cruz-Aire Type); Hydro-Blaster (10,000 PSI or Over); Milling Machine; Skid Rig; Traveling Crane (Bridge Type).	32.42	20.46	52.88

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
511	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Bulldozer or Endloader (Over 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Environmental Burner; Gantrys (Under 20,000 Lbs.); Grader or Motor Patrol; High Pressure Utility Locating Machine (Daylighting Machine); Manhoist; Material or Stack Hoist; Mechanic or Welder; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tining or Curing Machine; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket). Future Increase(s): Add $1/hr on 6/2/2013.	32.39	18.46	50.85
512	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Grout Pump; Hoist (Tugger, Automatic); Industrial Locomotives; Jeep Digger; Lift Slab Machine; Mulcher; Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames. Future Increase(s): Add $1/hr on 6/2/2013.	30.32	18.46	48.78
513	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Boatmen (NOT Performing Work on the Great Lakes); Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Elevator; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Forklift; Generator (&/or 150 KW or Over); Greaser; Heaters (Mechanical); Loading Machine (Conveyor); Oiler; Post Hole Digger or Driver; Prestress Machine; Pump (3 Inch or Over) or Well Points; Refrigeration Plant or Freeze Machine; Robotic Tool Carrier (With or Without Attachments); Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add $1/hr on 6/2/2013.	29.69	18.46	48.15
514	Gas or Utility Pipeline, Except Sewer & Water (Primary Equipment). Future Increase(s): Add $2/hr on 1/1/2013.	34.89	20.59	55.48
515	Gas or Utility Pipeline, Except Sewer & Water (Secondary Equipment). Future Increase(s): Add $1.60/hr on 06/01/2013; Add $1.60/hr on 06/01/2014; Add $1.65/hr on 06/01/2015.	31.32	17.95	49.27

516	Fiber Optic Cable Equipment Future Increase(s): Add $1.75/hr on 02/01/2013; Add $1.75/hr on 02/01/2014	26.69	16.65	43.34

SEWER, WATER OR TUNNEL CONSTRUCTION

Includes those projects that primarily involve public sewer or water distribution, transmission or collection systems and related tunnel work (excluding buildings).

SKILLED TRADES

Fringe Benefits Must Be Paid On All Hours Worked

CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
103	Bricklayer, Blocklayer or Stonemason Future Increase(s): Add $1.45/hr on 6/01/2013 Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	35.80	16.87	52.67
105	Carpenter Future Increase(s): Add $.75/hr on 6/3/2013. Add $1.25/hr on 6/2/2014. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.93	19.81	52.74
107	Cement Finisher Future Increase(s): Add $1.87 on 6/1/13; Add $1.87 on 6/1/14; Add $1.87 on 6/1/15; Add $1.75 on 6/1/16. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.40/hr when the Wisconsin Department of Transportation or responsible governing agency requires that work be performed at night under artificial illumination with traffic control and the work is completed after sunset and before sunrise.	32.09	16.13	48.22
109	Electrician Future Increase(s): Add $1.60/hr on 6/1/2013. Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.20	21.71	53.91
111	Fence Erector	22.50	3.65	26.15
116	Ironworker	30.90	19.11	50.01
118	Line Constructor (Electrical)	37.05	16.94	53.99
125	Pavement Marking Operator	28.10	15.00	43.10
126	Piledriver	30.66	15.31	45.97
130	Plumber	36.97	17.66	54.63

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
135	Steamfitter	38.26	19.49	57.75
137	Teledata Technician or Installer	21.26	11.75	33.01
143	Tuckpointer, Caulker or Cleaner	32.01	16.85	48.86
144	Underwater Diver (Except on Great Lakes)	37.45	19.45	56.90
146	Well Driller or Pump Installer	21.00	2.23	23.23
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	28.24	15.10	43.34
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	29.64	16.44	46.08
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.94	13.57	39.51
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.08	12.96	37.04
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	11.90	33.65

TRUCK DRIVERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
201	Single Axle or Two Axle	25.87	13.00	38.87
203	Three or More Axle	17.54	13.85	31.39
204	Articulated, Euclid, Dumptor, Off Road Material Hauler	31.89	17.98	49.87
205	Pavement Marking Vehicle	20.85	11.02	31.87
207	Truck Mechanic	17.06	7.52	24.58

LABORERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
301	General Laborer Future Increase(s): Add $.80/hr. on 06/03/2013 Premium Increase(s): Add $.20 for blaster, bracer, manhole builder, caulker, bottomman and power tool; Add $.55 for pipelayer; Add $1.00 for tunnel work 0-15 lbs. compressed air; Add $2.00 for over 15-30 lbs. compressed air; Add $3.00 for over 30 lbs. compressed air.	25.53	13.89	39.42
303	Landscaper	26.92	12.51	39.43

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
304	Flagperson or Traffic Control Person	17.33	15.72	33.05
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	17.81	12.22	30.03
314	Railroad Track Laborer	15.00	7.65	22.65

HEAVY EQUIPMENT OPERATORS
SEWER, WATER OR TUNNEL WORK

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
521	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Master Mechanic; Pile Driver. Future Increase(s): Add $1/hr on 6/2/2013. Premium Increase(s): Add $.50/hr for >200 Ton / Add $1/hr at 300 Ton / Add $1.50 at 400 Ton / Add $2/hr at 500 Ton & Over.	35.12	18.46	53.58
522	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump (Over 46 Meter), Concrete Conveyor (Rotec or Bidwell Type); Concrete Spreader & Distributor; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Dredge (NOT Performing Work on the Great Lakes); Milling Machine; Skid Rig; Telehandler; Traveling Crane (Bridge Type). Future Increase(s): Add $1/hr on 6/2/2013.	32.92	18.46	51.38
523	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Boring Machine (Horizontal or Vertical); Bulldozer or Endloader (Over 40 hp); Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Concrete Pump (46 Meter & Under), Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Manhoist; Material or Stack Hoist; Mechanic or Welder; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yd or More Capacity; Screed (Milling Machine); Sideboom; Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Tractor or Truck Mounted Hydraulic Crane (10 Tons or Under); Trencher (Wheel Type or Chain Type Having Over 8-Inch Bucket). Future Increase(s): Add $1/hr on 6/2/2013.	32.39	18.46	50.85

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
524	Backfiller; Broom or Sweeper; Bulldozer or Endloader (Under 40 hp); Compactor (Self-Propelled 85 Ft Total Drum Width & Over, or Tractor Mounted, Towed & Light Equipment); Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Finishing Machine (Road Type); Environmental Burner; Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Hoist (Tugger, Automatic); Grout Pump; Jeep Digger; Lift Slab Machine; Mulcher; Power Subgrader; Pump (3 Inch or Over) or Well Points; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Screw or Gypsum Pumps; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Stump Chipper; Tining or Curing Machine; Trencher (Wheel Type or Chain Type Having 8-Inch Bucket & Under); Winches & A-Frames.	31.89	18.11	50.00
525	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Compactor (Self-Propelled 84 Ft Total Drum Width & Under, or Tractor Mounted, Towed & Light Equipment); Crusher, Screening or Wash Plant; Farm or Industrial Type Tractor; Fireman (Asphalt Plant NOT Performing Work on the Great Lakes); Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Loading Machine (Conveyor); Post Hole Digger or Driver; Refrigeration Plant or Freeze Machine; Rock, Stone Breaker; Skid Steer Loader (With or Without Attachments); Vibratory Hammer or Extractor, Power Pack.	29.19	19.19	48.38
526	Boiler (Temporary Heat); Forklift; Greaser; Oiler.	30.44	19.10	49.54
527	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	37.45	19.45	56.90
528	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	37.45	19.45	56.90
529	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or More); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	27.75	19.15	46.90
530	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under), Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	27.75	19.15	46.90

LOCAL STREET OR MISCELLANEOUS PAVING CONSTRUCTION

Includes roads, streets, alleys, trails, bridges, paths, racetracks, parking lots and driveways (except residential or agricultural), public sidewalks or other similar projects (excluding projects awarded by the Wisconsin Department of Transportation).

SKILLED TRADES

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
103	Bricklayer, Blocklayer or Stonemason	33.00	15.00	48.00
105	Carpenter	30.16	15.31	45.47
107	Cement Finisher	31.48	15.68	47.16
109	Electrician Premium Increase(s): DOT PREMIUM: Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day.	32.94	18.80	51.74
111	Fence Erector	22.50	3.65	26.15
116	Ironworker	35.00	28.54	63.54
118	Line Constructor (Electrical)	37.05	16.94	53.99
124	Painter	24.80	14.78	39.58
125	Pavement Marking Operator	28.10	15.00	43.10
126	Piledriver	30.66	15.31	45.97
133	Roofer or Waterproofer	29.40	18.81	48.21
137	Teledata Technician or Installer	21.26	11.75	33.01
143	Tuckpointer, Caulker or Cleaner	32.01	16.85	48.86
144	Underwater Diver (Except on Great Lakes)	37.45	19.45	56.90
150	Heavy Equipment Operator - ELECTRICAL LINE CONSTRUCTION ONLY	29.64	14.55	44.19
151	Light Equipment Operator -ELECTRICAL LINE CONSTRUCTION ONLY	29.64	16.44	46.08
152	Heavy Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	25.94	13.57	39.51
153	Light Truck Driver - ELECTRICAL LINE CONSTRUCTION ONLY	24.08	12.96	37.04
154	Groundman - ELECTRICAL LINE CONSTRUCTION ONLY	21.75	11.90	33.65

TRUCK DRIVERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
201	Single Axle or Two Axle	25.87	13.00	38.87
203	Three or More Axle	17.06	7.52	24.58
204	Articulated, Euclid, Dumptor, Off Road Material Hauler Future Increase(s): Add $1/hr on 6/2/2013.	32.39	18.46	50.85
205	Pavement Marking Vehicle	20.85	11.02	31.87
206	Shadow or Pilot Vehicle	25.87	13.00	38.87
207	Truck Mechanic	17.06	7.52	24.58

LABORERS

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
301	General Laborer Future Increase(s): Add $1.70/hr on 6/1/2013; Add $1.60/hr on 6/1/2014. Premium Increase(s): Add $.10/hr for topman, air tool operator, vibrator or tamper operator (mechanical hand operated), chain saw operator and demolition burning torch laborer; Add $.15/hr for bituminous worker (raker and luteman), formsetter (curb, sidewalk and pavement) and strike off man; Add $.20/hr for blaster and powderman; Add $.25/hr for bottomman; Add $.35/hr for line and grade specialist; Add $.45/hr for pipelayer. DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr for work on projects involving temporary traffic control setup, for lane and shoulder closures, when work under artificial illumination conditions is necessary as required by the project provisions (including prep time prior to and/or cleanup after such time period).	28.07	13.90	41.97
303	Landscaper	18.25	2.99	21.24
304	Flagperson or Traffic Control Person	17.33	15.72	33.05
311	Fiber Optic Laborer (Outside, Other Than Concrete Encased)	17.81	12.22	30.03
314	Railroad Track Laborer	15.00	7.65	22.65

HEAVY EQUIPMENT OPERATORS
CONCRETE PAVEMENT OR BRIDGE WORK

Fringe Benefits Must Be Paid On All Hours Worked

CODE	TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
541	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self-Erecting Tower Crane With a Lifting Capacity Of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic. Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor-wages-eeo/index.shtm.	35.22	19.90	55.12
542	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity of 4,000 Lbs. & Under; Crane, Tower Crane Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor-wages-eeo/index.shtm.	34.72	19.90	54.62

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
543	Air Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Automatic Subgrader (Concrete); Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Boring Machine (Directional, Horizontal or Vertical); Bridge (Bidwell) Paver; Bulldozer or Endloader; Concrete Batch Plant, Batch Hopper; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Bump Cutter, Grinder, Planing or Grooving Machine; Concrete Conveyor System; Concrete Laser/Screed; Concrete Paver (Slipform); Concrete Pump, Concrete Conveyor (Rotec or Bidwell Type); Concrete Slipform Placer Curb & Gutter Machine; Concrete Spreader & Distributor; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Grout Pump; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Straddle Carrier or Travel Lift; Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames. Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor-wages-eeo/index.shtm.	34.22	19.90	54.12
544	Backfiller; Belting, Burlap, Texturing Machine; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Jeep Digger; Joint Sawer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (WIth or Without Attachments); Self Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler; Tining or Curing Machine. Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14. Premium Increase(s): DOT PREMIUMS: 1) Pay two times the hourly basic rate on Sunday, New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day & Christmas Day. 2) Add $1.25/hr night work premium. See DOT's website for details about the applicability of this night work premium at: http://roadwaystandards.dot.wi.gov/hcci/labor-wages-eeo/index.shtm.	33.96	19.90	53.86

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
545	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Concrete Proportioning Plant; Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack.	18.50	0.67	19.17
546	Fiber Optic Cable Equipment.	25.74	15.85	41.59
547	Work Performed on the Great Lakes Including Diver; Wet Tender or Hydraulic Dredge Engineer.	37.45	19.45	56.90
548	Work Performed on the Great Lakes Including 70 Ton & Over Tug Operator; Assistant Hydraulic Dredge Engineer; Crane or Backhoe Operator; Hydraulic Dredge Leverman or Diver's Tender; Mechanic or Welder.	37.45	19.45	56.90
549	Work Performed on the Great Lakes Including Deck Equipment Operator or Machineryman (Maintains Cranes Over 50 Tons or Backhoes 115,000 Lbs. or more); Tug, Launch or Loader, Dozer or Like Equipment When Operated on a Barge, Breakwater Wall, Slip, Dock or Scow, Deck Machinery.	27.75	19.15	46.90
550	Work Performed on the Great Lakes Including Deck Equipment Operator; Machineryman or Fireman (Operates 4 Units or More or Maintains Cranes 50 Tons or Under or Backhoes 115,000 Lbs. or Under); Deck Hand, Deck Engineer or Assistant Tug Operator; Off Road Trucks - Great Lakes ONLY.	27.75	19.15	46.90

HEAVY EQUIPMENT OPERATORS
ASPHALT PAVEMENT OR OTHER WORK

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
551	Crane, Tower Crane, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of Over 100 Tons, Self Erecting Tower Crane With a Lifting Capacity of Over 4,000 Lbs., Crane With Boom Dollies; Crane, Tower Crane, Pedestal Tower or Derrick, With Boom, Leads and/or Jib Lengths Measuring 176 Ft or Over; Master Mechanic.	34.62	17.98	52.60
552	Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of 130,000 Lbs. or Over; Caisson Rig; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With or Without Attachments, With a Lifting Capacity of 100 Tons or Under, Self-Erecting Tower Crane With a Lifting Capacity Of 4,000 Lbs. & Under; Crane, Tower Crane, Portable Tower, Pedestal Tower or Derrick, With Boom, Leads &/or Jib Lengths Measuring 175 Ft or Under; Dredge (NOT Performing Work on the Great Lakes); Licensed Boat Pilot (NOT Performing Work on the Great Lakes); Pile Driver. Future Increase(s): Add $1/hr on 6/2/2013.	32.92	18.46	51.38

CODE	Fringe Benefits Must Be Paid On All Hours Worked TRADE OR OCCUPATION	HOURLY BASIC RATE OF PAY $	HOURLY FRINGE BENEFITS $	TOTAL $
553	Air, Track, Rotary or Percussion Drilling Machine &/or Hammers, Blaster; Asphalt Heater, Planer & Scarifier; Asphalt Milling Machine; Asphalt Screed; Backhoe (Track Type) Having a Mfgr.'s Rated Capacity of Under 130,000 Lbs., Backhoe (Mini, 15,000 Lbs. & Under); Bituminous (Asphalt) Plant & Paver, Screed; Boring Machine (Directional, Horizontal or Vertical); Bulldozer or Endloader; Concrete Breaker (Large, Auto, Vibratory/Sonic, Manual or Remote); Concrete Conveyor System; Concrete Laser/Screed; Concrete Slipform Placer Curb & Gutter Machine; Crane (Carry Deck, Mini) or Truck Mounted Hydraulic Crane (10 Tons or Under); Crane With a Lifting Capacity of 25 Tons or Under; Forestry Equipment, Timbco, Tree Shear, Tub Grinder, Processor; Gradall (Cruz-Aire Type); Grader or Motor Patrol; Hydro-Blaster (10,000 PSI or Over); Loading Machine (Conveyor); Manhoist; Material or Stack Hoist; Mechanic or Welder; Milling Machine; Post Hole Digger or Driver; Railroad Track Rail Leveling Machine, Tie Placer, Extractor, Tamper, Stone Leveler or Rehabilitation Equipment; Roller (Over 5 Ton); Scraper (Self Propelled or Tractor Drawn) 5 cu yds or More Capacity; Shoulder Widener; Sideboom; Skid Rig; Stabilizing or Concrete Mixer (Self-Propelled or 14S or Over); Tractor (Scraper, Dozer, Pusher, Loader); Tractor or Truck Mounted Hydraulic Backhoe; Trencher (Wheel Type or Chain Type); Tube Finisher; Tugger (NOT Performing Work on the Great Lakes); Winches & A-Frames.	32.67	18.30	50.97
554	Backfiller; Broom or Sweeper; Compactor (Self-Propelled or Tractor Mounted, Towed & Light Equipment); Concrete Finishing Machine (Road Type); Environmental Burner; Farm or Industrial Type Tractor; Fireman (Asphalt Plant, Pile Driver & Derrick NOT Performing Work on the Great Lakes); Forklift; Greaser; Hoist (Tugger, Automatic); Jeep Digger; Joint Sawer (Multiple Blade); Launch (NOT Performing Work on the Great Lakes); Lift Slab Machine; Mechanical Float; Mulcher; Power Subgrader; Robotic Tool Carrier (With or Without Attachments); Roller (Rubber Tire, 5 Ton or Under); Self-Propelled Chip Spreader; Shouldering Machine; Skid Steer Loader (With or Without Attachments); Telehandler. Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14.	33.67	19.55	53.22
555	Air Compressor (&/or 400 CFM or Over); Air, Electric or Hydraulic Jacking System; Augers (Vertical & Horizontal); Automatic Belt Conveyor & Surge Bin; Boiler (Temporary Heat); Crusher, Screening or Wash Plant; Generator (&/or 150 KW or Over); Heaters (Mechanical); High Pressure Utility Locating Machine (Daylighting Machine); Mudjack; Oiler; Prestress Machine; Pug Mill; Pump (3 Inch or Over) or Well Points; Rock, Stone Breaker; Screed (Milling Machine); Stump Chipper; Tank Car Heaters; Vibratory Hammer or Extractor, Power Pack. Future Increase(s): Add $2/hr on 6/1/13; Add $1.75/hr on 6/1/14.	33.67	19.55	53.22
556	Fiber Optic Cable Equipment.	25.74	15.85	41.59

********** END OF RATES **********

Department of Workforce Development
Equal Rights Division
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STATE OF WISCONSIN
DWD
Department of Workforce Development

Scott Walker, Governor
Reginald J. Newson, Secretary
Joe Handrick, Division Administrator

The documents following the Prevailing Wage Rate Determination consist of 18 pages of various forms/documents that will be used throughout the completion of the project. The chart below lists the form number, form/document name, the party who uses the document, and the document's number of pages. If you have any questions regarding these forms please call the Prevailing Wage Office at (608)266-6861.

ERD Form Number	Form Name	Party Who Uses the Form	Pages
16056	Post the White Sheet	Contracting agency	1
16770	Substance Abuse Prevention on Public Works and Publicly Funded Projects, §103.503, Wis. Stats.	All contractors working on public works and publicly funded private construction projects	1
10908	Consolidated List of Debarred Contractors	Any party contracting someone to complete work on a prevailing wage project	2
7777	Disclosure of Ownership	Contractors that meet the criteria set out in (3)(A)&(B) of the form	1
5724	Prime Contractor Affidavit of Compliance	Prime contractor files with contracting agency upon completion of the work before receiving final payment	2
10584	Agent or Subcontractor Affidavit of Compliance	Subcontractors file with their awarding contractor upon completion of their work on the project before receiving final payment	2
10880	Request to Employ Subjourneyperson	Contractors wishing to employ a subjourneyperson(s)	1
	Prevailing Wage - Public Entity Project Owners	Explanation of project owner responsibilities	2
	Prevailing Wage – Contractors	Explanation of contractor responsibilities	2
	Summary of Prevailing Wage Law Changes Effective July 1, 2011	Information for public entity or any other interested party	4

09/01/12

State of Wisconsin
Department of Workforce Development
Equal Rights Division
Labor Standards Bureau

POST THE WHITE SHEET

As the public entity receiving this prevailing wage rate determination, YOU ARE REQUIRED by law to post the prevailing wage rate determination (i.e., white sheet) in at least one conspicuous and easily accessible place on the project site that is available to all construction workers. The white sheet must remain posted from the onset of the project until all construction labor on the project has been completed.
[*See,* Wis. Admin. Code §DWD 290.12(1)]

Posting the white sheet inside the general contractor's trailer does not meet this requirement. That placement is not available/accessible to all workers and is not a location over which you have control.

If you have questions about posting, please call (608)266-6861 and ask for prevailing wage intake.

Disclaimer

Employers performing work on public works and publicly funded private construction projects in Wisconsin are required to have a written substance abuse testing program in place. The provisions of this requirement are contained in Sec. 103.503, Wis. Stats. The Department of Workforce Development is neither responsible for enforcement of this law nor authorized to answer questions concerning its provisions. For legal advice on complying with Sec. 103.503, Wis. Stats., you may wish to consult with a private attorney.

103.503 Substance abuse prevention on public works and publicly funded projects. (1) DEFINITIONS. In this section:

(a) "Accident" means an incident caused, contributed to, or otherwise involving an employee that resulted or could have resulted in death, personal injury, or property damage and that occurred while the employee was performing the work described in s. 66.0903 (4), 66.0904 (3), or 103.49 (2m) on a project.

(b) "Alcohol" has the meaning given in s. 340.01 (1q).

(c) "Contracting agency" means a local governmental unit, as defined in s. 66.0903 (1) (d), a state agency, as defined in s. 103.49 (1) (f), or an owner or developer under s. 66.0904 that has contracted for the performance of work on a project.

(d) "Drug" means any controlled substance, as defined in s. 961.01 (4), or controlled substance analog, as defined in s. 961.01 (4m), for which testing is required by an employer under its substance abuse prevention program under this section.

(e) "Employee" means a laborer, worker, mechanic, or truck driver who performs the work described in s. 66.0903 (4), 66.0904 (3), or 103.49 (2m) on a project.

(f) "Employer" means a contractor, subcontractor, or agent of a contractor or subcontractor that performs work on a project.

(g) "Project" mean a project of public works that is subject to s. 66.0903 or 103.49 or a publicly funded private construction project that is subject to s. 66.0904.

(2) SUBSTANCE ABUSE PROHIBITED. No employee may use, possess, attempt to possess, distribute, deliver, or be under the influence of a drug, or use or be under the influence of alcohol, while performing the work described in s. 66.0903 (4), 66.0904 (3), or 103.49 (2m) on a project. An employee is considered to be under the influence of alcohol for purposes of this subsection if he or she has an alcohol concentration that is equal to or greater than the amount specified in s. 885.235 (1g) (d).

(3) SUBSTANCE ABUSE PREVENTION PROGRAMS REQUIRED. (a) Before an employer may commence work on a project, the employer shall have in place a written program for the prevention of substance abuse among its employees. At a minimum, the program shall include all of the following:

1. A prohibition against the actions or conditions specified in sub. (2).

2. A requirement that employees performing the work described in s. 66.0903 (4), 66.0904 (3), or 103.49 (2m) on a project submit to random, reasonable suspicion, and post-accident drug and alcohol testing and to drug and alcohol testing before commencing work on a project, except that testing of an employee before commencing work on a project is not required if the employee has been participating in a random testing program during the 90 days preceding the date on which the employee commenced work on the project.

3. A procedure for notifying an employee who violates sub. (2), who tests positive for the presence of a drug in his or her system, or who refuses to submit to drug or alcohol testing as required under the program that the employee may not perform work on a project until he or she meets the conditions specified in sub. (4) (b) 1. and 2.

(b) Each employer shall be responsible for the cost of developing, implementing, and enforcing its substance abuse prevention program, including the cost of drug and alcohol testing of its employees under the program. The contracting agency is not responsible for that cost, for the cost of any medical review of a test result, or for any rehabilitation provided to an employee.

(4) EMPLOYEE ACCESS TO PROJECT. (a) No employer may permit an employee who violates sub. (2), who tests positive for the presence of a drug in his or her system, or who refuses to submit to drug or alcohol testing as required under the employer's substance abuse prevention program under sub. (3) to perform work on a project until he or she meets the conditions specified in par. (b) 1. and 2. An employer shall immediately remove an employee from work on a project if any of the following occurs:

1. The employee violates sub. (2), tests positive for the presence of a drug in his or her system, or refuses to submit to drug or alcohol testing as required under the employer's substance abuse prevention program.

2. An officer or employee of the contracting agency has a reasonable suspicion that the employee is in violation of sub. (2) and requests the employer to immediately remove the employee from work on the project.

(b) An employee who is barred or removed from work on a project under par. (a) may commence or return to work on the project upon his or her employer providing to the contracting agency documentation showing all of the following:

1. That the employee has tested negative for the presence of drugs in his or her system and is not under the influence of alcohol as described in sub. (2).

2. That the employee has been approved to commence or return to work on the project in accordance with the employer's substance abuse prevention program.

(c) Testing for the presence of drugs or alcohol in an employee's system and the handling of test specimens shall be conducted in accordance with guidelines for laboratory testing procedures and chain-of-custody procedures established by the substance abuse and mental health services administration of the federal department of health and human services.

(5) LOCAL ORDINANCES; STRICT CONFORMITY REQUIRED. A local governmental unit, as defined in s. 66.0903 (1) (d), may enact an ordinance regulating the conduct regulated under this section only if the ordinance strictly conforms to this section.

History: 2005 a. 181; 2009 a. 28.

Consolidated List of Debarred Contractors
Prepared and Issued By
State of Wisconsin
Department of Workforce Development

This list has been prepared in accordance with the provisions of s. 66.0903(12), s. 66.0904(10) and s. 103.49(7), Stats. and Chapter DWD 294 of the Wisconsin Administrative Code. All contractors on this list were found to have committed a "debarable offense" related to certain labor standard provisions determined or established for a state or local public works project or publicly funded private construction project. No state agency, local governmental unit or owner or developer may knowingly solicit bids from, negotiate with or award any contracts to or approve or allow any subcontracts with a debarred contractor, including all divisions, affiliates or other organizational elements of such contractor that are engaged in construction business activities, until the debarment is terminated. The name of each debarred contractor must remain on this list for a period of three (3) years from the termination date indicated below. The contractor is, however, only "debarred" from the "effective date" through the "termination date" indicated for that contractor. Questions regarding this list should be addressed to Julie Eckenwalder, Equal Rights Division, P. O. Box 8928, Madison, WI 53708 or call (608) 266-3148. Deaf, hearing or speech-impaired callers may contact the department by calling its TDD number (608) 264-8752.

Name of Contractor	Address	Effective Date	Termination Date	Cause Code	Date of Violation(s)	Limitations/Deviations
Abel, Mike	*See,* Abel Electric, Inc					
Abel Electric, Inc	3385 Belmar Rd Green Bay, WI 54313	9/1/12	8/31/2015	1	2011	None
Atkins, Scott	*See,* Freedom Insulation, Inc					
Boecker, Roger	*See,* R-Way Pumping, Inc					
Castlerock Commercial Construction, Inc	PO Box 11699 Milwaukee, WI 53211-0699	2/1/12	1/31/15	1, 2 and 4	2009 & 2010	None
Custom Heating & Air LLC	283 Tony Lane Green Bay, WI 54304	12/1/06	11/30/09	1, 2 and 4	2003 & 2004	None
Dem/Ex Group, Inc	805 S Adams St Manito, IL 61546	12/1/11	11/30/14	1 and 2	2010	None
Fisher, Ed &/or Fisher, Rhonda	*See,* Dem/Ex Group, Inc					
Freedom Insulation, Inc	117925 219th Ave Chippewa Falls, WI 54729	9/1/11	8/31/14	1	2008-2010	None

Name of Contractor	Address	Effective Date	Termination Date	Cause Code	Date of Violation(s)	Limitations/Deviations
JT Roofing, Inc	350 Tower Dr Saukville, WI 53080	6/1/11	5/31/15	1,2 and 4	2007 & 2008	None
Jinkins, Richard	*See,* Castlerock Commercial Construction, Inc.					
Joseph Stoller Company	N8426 Hwy 42 Algoma, WI 54201	2/1/07	1/31/10	1 and 2	2004 & 2005	None
Keiver, David	*See,* Custom Heating & Air LLC					
Ofstie, Darin	*See,* Precision Excavating and Grading, LLC					
Precision Excavating and Grading, LLC or Precision Excavating Enterprises, LLC	2104 Pierce Saint Croix Rd Baldwin, WI 54002	5/1/11	4/30/14	1, 2 and 4	2006-2008	None
R-Way Pumping, Inc	3023 Lake Maria Rd Freeport, MN 56331	3/1/12	2/28/15	1, 2 and 4	2008	None
Stoller Enterprises LLC	N8426 Hwy 42 Algoma, WI 54201-9552	2/1/2007	1/31/10	1 and 2	2005 to 2006	None
Stoller, Joseph	*See,* Joseph Stoller Company					
Stoller, Patrick J	*See,* Stoller Enterprises LLC					
Thull, Gerald T	*See,* JT Roofing, Inc.					

Cause Code: 1 = Failure to Pay Straight Time 2 = Failure to Pay Overtime 3 = Kickback 4 = Payroll Records.

State of Wisconsin
Department of Workforce Development
Equal Rights Division

Disclosure of Ownership

The statutory authority for the use of this form is prescribed in Sections 66.0903(12)(d), 66.0904(10)(d) and 103.49(7)(d), Wisconsin Statutes.
The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes.
Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1) (m), Wisconsin Statutes]

(1) On the date a contractor submits a bid to or completes negotiations with a state agency, local governmental unit, or developer, investor or owner on a project subject to Section 66.0903, 66.0904 or 103.49, Wisconsin Statutes, the contractor shall disclose to such state agency, local governmental unit, or developer, investor or owner, the name of any "other construction business", which the contractor, or a shareholder, officer or partner of the contractor, owns or has owned within the preceding three (3) years.

(2) The term "other construction business" means any business engaged in the erection, construction, remodeling, repairing, demolition, altering or painting and decorating of buildings, structures or facilities. It also means any business engaged in supplying mineral aggregate, or hauling excavated material or spoil as provided by Sections 66.0903(3), 66.0904(2), 103.49(2) and 103.50(2), Wisconsin Statutes.

(3) This form must ONLY be filed, with the state agency project owner, local governmental unit project owner, or developer, investor or owner of a publicly funded private construction project that will be awarding the contract, if **both (A) and (B) are met**.

(A) The contractor, or a shareholder, officer or partner of the contractor:
(1) Owns at least a 25% interest in the "other construction business", indicated below, on the date the contractor submits a bid or completes negotiations.
(2) Or has owned at least a 25% interest in the "other construction business" at any time within the preceding three (3) years.

(B) The Wisconsin Department of Workforce Development (DWD) has determined that the "other construction business" has failed to pay the prevailing wage rate or time and one-half the required hourly basic rate of pay, for

Other Construction Business

Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code
Name of Business			
Street Address or P O Box	City	State	Zip Code

I hereby state under penalty of perjury that the information, contained in this document, is true and accurate according to my knowledge and belief.

Print the Name of Authorized Officer			
Signature of Authorized Officer	Date Signed		
Name of Corporation, Partnership or Sole Proprietorship			
Street Address or P O Box	City	State	Zip Code

If you have any questions call (608) 266-6861

State of Wisconsin
Department of Workforce Development
Equal Rights Division

Prime Contractor Affidavit of Compliance With Prevailing Wage Rate Determination

Authorization for this form is provided under Sections 66.0903(9)(c), 66.0904(7)(c) and 103.49(4r)(c) Wisconsin Statutes.
The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes.
Personal information you provide may be used for secondary purposes [Privacy Law, s. 15.04(1)(m), Wisconsin Statutes].

This form must **ONLY** be filed with the **Awarding Agency** indicated below.

State Of)	Project Name	
	DWD Determination Number	Project Number (if applicable)
)SS	Date Determination Issued	Date of Contract
County Of)	Awarding Agency	
	Date Work Completed	

After being duly sworn, the person whose name and signature appears below hereby states under penalty of perjury that

- **I am** the duly authorized officer of the corporation, partnership, sole proprietorship or business indicated below and have recently completed all of the work required under the terms and conditions of a contract with the above-named awarding agency and make this affidavit in accordance with the requirements set forth in Section 66.0903(9)(c), 66.0904(7)(c) or 103.49(4r)(c), Wisconsin Statutes and Chapter DWD 290 of the Wisconsin Administrative Code in order to obtain FINAL PAYMENT from such awarding agency.
- **I have** fully complied with all the wage and hour requirements applicable to this project, including all of the requirements set forth in the prevailing wage rate determination indicated above which was issued for such project by the Department of Workforce Development on the date indicated above.
- **I have** received the required affidavit of compliance from each of my agents and subcontractors that performed work on this project and have listed each of their names and addresses on page 2 of this affidavit.
- **I have** full and accurate records that clearly indicate the name and trade or occupation of every worker(s) that I employed on this project, including an accurate record of the hours worked and actual wages paid to such worker(s).
- **I will** retain the records and affidavit(s) described above and make them available for inspection for a period of at least three (3) years from the completion date indicated above at the address indicated below and shall not remove such records or affidavit(s) without prior notification to the awarding agency indicated above.

Name of Corporation, Partnership, Sole Proprietorship, Business, State Agency or Local Governmental Unit				
Street Address	City	State	Zip Code	Telephone Number
Print Name of Authorized Officer			Date Signed	
Signature of Authorized Officer				

List of Agents and Subcontractors

Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number			Telephone Number		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number			Telephone Number		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number			Telephone Number		
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Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number			Telephone Number		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number			Telephone Number		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number			Telephone Number		

State of Wisconsin
Department of Workforce Development
Equal Rights Division

Agent or Subcontractor Affidavit of Compliance With Prevailing Wage Rate Determination

Authorization for this form is provided under Sections 66.0903(9)(b), 66.0904(7)(b) and 103.49(4r)(9b), Wisconsin Statutes. The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes.
Personal information you provide may be used for secondary purposes [Privacy Law, Section 15.04(1)(m), Wisconsin Statutes].

This form must **ONLY** be filed with the **Awarding Contractor** indicated below.

State Of _____))SS County Of _____)	Project Name	
	DWD Determination Number	Project Number (if applicable)
	Date Determination Issued	Date of Subcontract
	Awarding Contractor	
	Date Work Completed	

After being duly sworn, the person whose name and signature appears below hereby states under penalty of perjury that

- **I am** the duly authorized officer of the corporation, partnership, sole proprietorship or business indicated below. We have recently completed all of the work required under the terms and conditions of a subcontract with the above-named awarding contractor. We make this affidavit in accordance with the requirements set forth in Section 66.0903(9)(b), 66.0904(7)(b) or 103.49(4r)(b), Wisconsin Statutes and Chapter DWD 290 of the Wisconsin Administrative Code in order to obtain FINAL PAYMENT from such awarding contractor.
- **I have** fully complied with the entire wage and hour requirements applicable to this project, including all of the requirements set forth in the prevailing wage rate determination indicated above which was issued for such project by the Department of Workforce Development on the date indicated above.
- **I have** received the required affidavit of compliance from each of my agents and subcontractors that performed work on this project and have listed each of their names and addresses on page 2 of this affidavit.
- **I have** full and accurate records that clearly indicate the name and trade or occupation of every worker(s) that I employed on this project, including an accurate record of the hours worked and actual wages paid to such worker(s).
- **I will** retain the records and affidavit(s) described above and make them available for inspection for a period of at least three (3) years from the completion date indicated above at the address indicated below and shall not remove such records or affidavit(s) without prior notification to the awarding contractor.

Name of Corporation, Partnership, Sole Proprietorship, Business, State Agency or Local Governmental Unit				
Street Address or PO Box	City	State	Zip Code	Telephone Number ( )
Print Name of Authorized Officer			Date Signed	
Authorized Officer Signature				

List of Agents and Subcontractors

Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
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Street Address			Street Address		
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Telephone Number ( )			Telephone Number ( )		
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Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		
Name			Name		
Street Address			Street Address		
City	State	Zip Code	City	State	Zip Code
Telephone Number ( )			Telephone Number ( )		

If you have any questions call (608) 266-6861

State of Wisconsin
Department of Workforce Development
Equal Rights Division
Labor Standards Bureau

Request to Employ Subjourneyperson

The use of this form is mandatory. The penalty for failing to complete this form is prescribed in Section 103.005(12), Wisconsin Statutes.
Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04(1)(m), Wisconsin Statutes].
The employer indicated below requests that the Department of Workforce Development (DWD) determine the prevailing wage rate(s) and related qualifications to enable such employer to use a subjourneyperson(s) on the following prevailing wage project, in accordance with the provisions of Section DWD 290.025, Wisconsin Administrative Code.

1. Name of Project Appearing on the Project Determination			
County	City, Village or Town		
DWD Project Determination Number	Project Number (if applicable)		
2. Job Classification(s) for which you request a subjourney rate (i.e., carpenter, electrician, plumber, etc.)			
a.	b.		
c.	d.		
3. Employer Name (Print)	Requester Name (Print)		
Address	City	State	Zip Code
Telephone Number ( )	Requester Title		
Email address (if you prefer to receive your response via email)	Fax Number (if you prefer to receive your response via fax) ( )		

READ CAREFULLY: I understand that this request is ONLY applicable to the project and job classification(s) listed above and that subjourney employees primarily work under the direction of and assist a skilled trade employee by frequently using the tools of a skilled trade and will NOT regularly perform the duties of a general laborer, heavy equipment operator or truck driver. If the subjourney employee regularly performs the work of a different trade or occupation, he/she will be compensated for such work at the applicable journeyperson prevailing wage rate. I agree to compensate subjourney employees in strict accordance with the directions received from the DWD.

Requester Signature	Date Signed

MAIL the completed request to:
EQUAL RIGHTS DIVISION, LABOR STANDARDS BUREAU
PO BOX 8928, MADISON WI 53708
OR
FAX the completed request to: (608) 267-0310 / **DO NOT e-mail your request.**
Call (608) 266-6861 for assistance in completing this form.

Department of Workforce Development
Equal Rights Division
P.O. Box 8928
Madison, WI 53708-8928
Telephone: (608) 266-6860
Fax: (608) 267-4592
TTY: (608) 264-8752

STATE OF WISCONSIN
DWD
Department of Workforce Development

Scott Walker, Governor
Reginald J. Newson, Secretary
John P. Conway, Division Administrator

PREVAILING WAGE – Public Entity Project Owners

Any public works project that has a total estimated project cost that equals or exceeds single-trade or multiple-trade project thresholds requires a prevailing wage rate determination issued by the Department of Workforce Development (DWD). Public works include erecting, constructing, remodeling, repairing, demolishing, alterations, painting and decorating projects for a local governmental unit or state agency. State law excludes minor service or maintenance work, warranty work, or work under a supply-and-installation contract. There is a statutory definition for each of these exclusions. The prevailing wage law that applies to local governmental units is §66.0903, Wis. Stats. The prevailing wage law that applies to state agencies is §103.49, Wis. Stats. The applicable administrative rules for all public entities are DWD 290 and DWD 294, Wis. Adm. Code.

Thresholds

A "single-trade project of public works" means a project in which a single trade accounts for 85% or more of the total labor cost of the project. The single trade threshold is $48,000.

A "multiple-trade project of public works" means a project in which no single trade accounts for 85% or more of the total labor cost of the project.

(a) The multiple-trade threshold is $100,000, unless a municipality falls under the description in (b).

(b) The multiple-trade threshold of $234,000 applies to public works projects erected, constructed, repaired, remodeled, or demolished by a private contractor for •a city or village with a population less than 2500 or •a town.

Effective July 1, 2011, a local governmental unit or state agency that has a public works project that equals or exceeds the prevailing wage thresholds must do all of the following:

- Request a prevailing wage rate determination for the project from DWD at least 30 days before soliciting bids or negotiating contracts. An Application for Prevailing Wage Rate Determination is available on the DWD website: http://dwd.wisconsin.gov/er/prevailing_wage_rate/default.htm
  To avoid waiting for a project determination use the on-line application system that permits the user to generate a determination immediately and save all documents in PDF form to the user's computer. Use this project determination on line application at the following address:

http://dwd.wisconsin.gov/er/prevailing_wage_rate/pw_online_determinations.htm

- Tell potential contractors the project is subject to state prevailing wage law when soliciting bids.

- Include the prevailing wage rate determination in the construction contract, or if there is no written contract, provide a copy of the project determination to each prime contractor.

- Award contracts to contractors who do *not* appear on the "Consolidated List of Debarred Contractors."

- Post the prevailing wage rate determination on the project site. (This document is often referred to as "the white sheet.")

- Notify project contractors that if DWD finds that a contractor violated the prevailing wage law, DWD will assess liquidated damages of 100% of the wages owed to employees.

- Obtain an Affidavit of Compliance from each prime contractor before making final payment for the project.

If the total estimated cost of the project exceeds the prevailing wage thresholds, a local governmental unit or state agency also must obtain a prevailing wage rate determination under the following circumstances:

- when a completed facility is leased, purchased, lease-purchased or otherwise acquired by or dedicated to a public entity in lieu of the public entity contracting for the project,

- when one public entity does work for another public entity,

- when a *private* entity will construct a road, street, bridge, sanitary sewer or water main project and dedicate it to a local governmental unit or the state for its ownership or maintenance (except for some residential subdivisions).

For more information, visit the prevailing wage website: http://dwd.wisconsin.gov/er/prevailing_wage_rate/default.htm. For further assistance, call the Equal Rights Division at 608-266-6861 and ask for prevailing wage.

Department of Workforce Development
Equal Rights Division
P.O. Box 8928
Madison, WI 53708-8928
Telephone: (608) 266-6860
Fax: (608) 267-4592
TTY: (608) 264-8752

STATE OF WISCONSIN
DWD
Department of Workforce Development

Scott Walker, Governor
Reginald J. Newson, Secretary
John P. Conway, Division Administrator

PREVAILING WAGE – Contractors

Any public works project that has a total estimated project cost that equals or exceeds prevailing wage project thresholds requires a prevailing wage rate determination issued by the Department of Workforce Development (DWD). Public works include erecting, constructing, remodeling, repairing, demolishing, alterations, painting and decorating projects for a local governmental unit or state agency. State law excludes minor service or maintenance work, warranty work, or work under a supply-and-installation contract. There is a statutory definition for each of these exclusions. The prevailing wage law that applies to local governmental units and their contractors is §66.0903, Wis. Stats. The prevailing wage law that applies to state agencies and their contractors is §103.49, Wis. Stats. The applicable administrative rules for all prevailing wage projects are DWD 290 and DWD 294, Wis. Adm. Code. These laws include provisions that apply to all contractors and subcontractors working on prevailing wage projects.

Effective July 1, 2011, any contractor or subcontractor working on a local governmental unit or state agency's public works project that equals or exceeds current prevailing wage project thresholds must do all of the following:

- Receive and review the project's prevailing wage rate determination (i.e., white sheet).
- Tell subcontractors the project is subject to state prevailing wage law and include the prevailing wage rate determination in the construction contract, or if there is no written contract, provide a copy of the project determination to each subcontractor.
- Hire subcontractors who do *not* appear on the "Consolidated List of Debarred Contractors."
- Notify subcontractors that if DWD finds that a contractor or subcontractor violated the prevailing wage law, DWD will assess liquidated damages of 100% of the wages owed to employees.

- Apply to DWD for subjourney wage rates prior to employing these individuals on the project.

- Receive and retain a completed Affidavit of Compliance from each subcontractor brought on to the project before providing final payment to those subcontractors.

- Submit a completed Affidavit of Compliance to the contractor who brought the subcontractor on to the project before receiving final payment for the project.

- Maintain payroll records for 3 years that comply with §§66.0903(10)(a) or 103.49(5)(a), Stats. and DWD 274.06.

- Respond to requests from DWD or the project owner to provide payroll records and/or respond to prevailing wage complaints filed by employees or third parties.

For more information, visit the prevailing wage website: http://dwd.wisconsin.gov/er/prevailing_wage_rate/default.htm. For further assistance, call the Equal Rights Division at 608-266-6861 and ask for prevailing wage.

SUMMARY OF PREVAILING WAGE LAW CHANGES EFFECTIVE JULY 1, 2011

(This document updated 07/27/11)

For further updates on this topic, refer to the prevailing wage website at:
http://dwd.wisconsin.gov/er/prevailing_wage_rate/default.htm

The recently approved State budget bill (2011 Wisconsin Act 40) includes major changes to prevailing wage laws (§§66.0903, 66.0904, 103.49 & 103.50, Wis. Stats.) effective JULY 1, 2011. Significant changes are described below.

Topic	Who's affected?	Brief description of requirement under §66.0903 or §103.49
Thresholds	All public entities & Contractors	The $25,000 threshold for public works projects has been changed to single-trade and multiple-trade project thresholds as noted below. The new thresholds apply to prevailing wage projects whose prime contract is awarded after June 30, 2011.
Non-applicability: Threshold for Single-Trade Projects	All public entities & Contractors	Any single-trade project of public works with an estimated cost of completion of less than $48,000 does not require a prevailing wage rate determination. "Single-trade project of public works" means a project of public works in which a single trade accounts for 85 percent or more of the total labor cost of the project.
Non-applicability: Threshold for Multiple-Trade Projects	All public entities except cities, towns & villages as noted below & Contractors	Any multiple-trade project of public works with an estimated cost of completion of less than $100,000 does not require a prevailing wage rate determination. "Multiple-trade project of public works" means a project of public works in which no single trade accounts for 85 percent or more of the total labor cost of the project.
Non-applicability: Threshold for Multiple-Trade Projects	Cities or villages with a population less than 2500 & Towns & Contractors	A multiple trade project of public works erected, constructed, repaired, remodeled, or demolished by a private contractor for a city or village with a population less than 2500, or a town with an estimated cost of completion of less than $234,000 does not require a prevailing wage rate determination. "Multiple-trade project of public works" means a project of public works in which no single trade accounts for 85 percent or more of the total labor cost of the project.
Non-applicability: Minor service & maintenance work	Towns & Contractors	The following TOWN projects only do not require a prevailing wage rate determination: • A project not funded under §86.31, Stats. (TRIP projects) that is limited to minor crack filling, chip or slurry sealing or other minor pavement patching, not including overlays. • The depositing of gravel on an existing gravel road applied solely to maintain the road; • Road shoulder maintenance; • Cleaning drainage or sewer ditches or structures; • Any other limited, minor work on public facilities or equipment that is routinely performed to prevent breakdown or deterioration.
Non-applicability: Work which a contractor or individual donates to a public entity	All public entities	Prevailing wage laws §§66.0903 & 103.49, Stats., do not apply to work performed on a project of public works for which the local governmental unit or the state or the state agency contracting for the project is not required to compensate any contractor, subcontractor, contractor's or subcontractor's agent, or individual for performing the work.

Topic	Who's affected?	Brief description of requirement under §66.0903 or §103.49
Non-applicability: Residential	All public entities	A prevailing wage rate determination is not required for the erection, construction, repair, remodeling, or demolition of a residential property containing 2 dwelling units or less.
Non-applicability: Residential subdivision infrastructure	All public entities	A prevailing wage rate determination is not required for a road, street, bridge, sanitary sewer, or water main project that is a part of a development in which at least 90 percent of the lots contain or will contain 2 dwelling units or less, as determined by the local governmental unit at the time of approval of the development, and that, on completion, is acquired by, or dedicated to, a local governmental unit (including under §236.13(2), Stats.), or the state, for ownership or maintenance by the local governmental unit or the state.
Non-applicability: Certain nursing homes	All public entities	Prevailing wage law §66.0903, Stats., does not apply to a project of public works involving the erection, construction, repair, remodeling, or demolition of a nursing home in a county having a population of less than 50,000 when the project commences no later than July 1, 2012.
Electronic certified payroll record	Contractors	The requirement that every contractor on a prevailing wage project submit to DWD monthly a certified record of employees who worked on the project and that DWD post these certified records on its Internet website is discontinued effective July 1, 2011. However, contractors who worked on prevailing wage projects during the period January 1, 2010 through June 30, 2011, must comply with the repealed law for work completed on projects during that period of time.
Payroll record inspection request by any person	Contractors & Complainants	Any person may request DWD to inspect the payroll records of any contractor working on a prevailing wage project. On receipt of such a request, the contractor must submit to DWD a certified record of its payroll records, other than personally identifiable information relating to an employee of the contractor, for no longer than a 4-week period. DWD may request records from a contractor under this provision no more than once per calendar quarter for each project of public works on which the contractor is performing work. The department may not charge a requester a fee for obtaining that information. DWD must make these certified records available for public inspection.
Complaints	Complainants	There are no longer investigation fees.
Statewide uniformity	Local govern-mental units	A local governmental unit may not enact & administer a prevailing wage ordinance/provision for public works or publicly funded private construction projects. Any extant laws to that effect are void.

Topic	Who's affected?	Brief description of requirement under §66.0903, §103.49 or §103.50
Covered employees	Truck drivers & Other workers & Contractors	A laborer, worker, mechanic, or truck driver who is employed to process, manufacture, pick up, or deliver materials or products from a commercial establishment that has a fixed place of business from which the establishment supplies processed or manufactured materials or products or from a facility that is not dedicated exclusively, or nearly so, to a project of public works is NOT entitled to receive the prevailing wage rate UNLESS any of the following applies: 1) the laborer, worker, mechanic, or truck driver is employed to go to the source of mineral aggregate such as sand, gravel, or stone and deliver that mineral aggregate to the site of a project of public works by depositing the material directly in final place, from the transporting vehicle or through spreaders from the transporting vehicle. 2) the laborer, worker, mechanic, or truck driver is employed to go to the site of a project of public works, pick up excavated material or spoil from the site of the project, and transport that excavated material or spoil away from the site of the project.
Annual Prevailing Wage Survey	All public entities	When establishing yearly prevailing wage rates, DWD may not use data from any construction work that is performed by a local governmental unit or a state agency.
Prevailing Wage Rates	DOT & Contractors & Employees	For state highway prevailing wage rates, DWD is required to include wage rates for work performed on Sundays, holidays and shift differentials based on the time of day or night when work is performed.

The 2009-2011 State budget bill (2009 Wisconsin Act 28) created a new prevailing wage law (§66.0904, Wis. Stats.) for PUBLICLY FUNDED PRIVATE CONSTRUCTION PROJECTS effective January 1, 2010. The current 2011-2013 State budget bill (2011 Wisconsin Act 32) REPEALS this law. So the publicly funded private construction projects law only applies to projects that awarded the prime contract during the period January 1, 2010 through June 30, 2011.

SINGLE & MULTIPLE TRADE PROJECT THRESHOLDS FOR §§66.0903 & 103.49, Wis. Stats. Effective July 1, 2011

The $25,000 threshold for public works projects has been changed to single-trade and multiple-trade project thresholds as described below. Projects of public works with total estimated costs of completion that equal or exceed these thresholds require a prevailing wage rate determination.

SINGLE-TRADE THRESHOLD

A "single-trade project of public works" means a project in which a single trade accounts for 85 percent or more of the total labor cost of the project.

The single trade threshold is $48,000.

MULTIPLE-TRADE THRESHOLDS

A "multiple-trade project of public works" means a project in which no single trade accounts for 85 percent or more of the total labor cost of the project.

(a) The multiple-trade threshold is $100,000, unless a municipality falls under the description in (b).

(b) The multiple-trade threshold of $234,000 applies to public works projects erected, constructed, repaired, remodeled, or demolished by a private contractor for:

- a city or village with a population less than 2500, or
- a town

APPLYING THE NEW THRESHOLDS

The department will apply the new single-trade & multiple-trade prevailing wage thresholds to projects of public works for which the prime contract is awarded on or after July 1, 2011.

SUPERSEDES DECISION WI20070010
U. S. DEPARTMENT OF LABOR
(DAVIS-BACON ACT, MINIMUM WAGE RATES)

STATE: Wisconsin
DECISION NUMBER: W1080010
DATE: February 1, 2013
DESCRIPTION OF WORK: Highways and Airport Runway and Taxiway Construction

LABORERS CLASSIFICATION:	Basic Hourly Rates	Fringe Benefits
Group 1: General Laborer; Tree Trimmer; Conduit Layer; Demolition and Wrecking Laborer; Guard Rail, Fence and Bridge Builder; Landscaper, Multiplate Culvert Assembler; Stone Handler; Bituminous Worker (Shoveler, Loader, Utility Man); Batch Truck Dumper; or Cement Handler; Bituminous Worker; (Dumper, Ironer, Smoother, Tamper); Concrete Handler	$26.92	13.45
Group 2: Air Tool Operator; Joint Sawer and Filler (Pavement); Vibrator or Tamper Operator (Mechanical Hand Operated);	27.02	13.45
Group 3: Bituminous Worker (Raker and Luteman); Formsetter (Curb, Sidewalk, and Pavement); Strike Off man	27.07	13.45
Group 4: Line and Grade Specialist	27.27	13.45
Group 5: Blaster and Powderman	27.12	13.45
Group 6: Flagperson; Traffic Control	23.55	13.45

CLASSES OF LABORER AND MECHANICS

Bricklayer	32.06	17.00
Carpenter	30.48	15.80
Millwright	32.11	15.80
Piledriverman	30.98	15.80
Ironworker (South of Edgerton and Milton)	34.34	25.72
Ironworker (Northern Area, Vicinity of Edgerton and Milton)	31.25	19.48
Cement Mason/Concrete Finisher	32.09	16.13
Electrician		See Page 3
Line Construction		
Lineman	38.25	18.00
Heavy Equipment Operator	34.43	16.71
Equipment Operator	30.60	15.41
Heavy Groundman Driver	26.78	14.11
Light Groundman Driver	24.86	13.45
Groundsman	21.04	12.16
Painter, Brush	24.50	16.27
Painter, Spray, Structural Steel,Bridges	25.50	16.27
Well Drilling:		
Well Driller	16.52	3.70

Truck Drivers:	Basic Hourly Rates	Fringe Benefits
1 & 2 Axles	23.16	17.13
Three or More Axles; Euclids, Dumptor & Articulated, Truck Mechanic	23.31	17.13

Notes: Welders receive rate prescribed for craft performing operation to which welding is incidental. Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR, 5.5(a)(1)(ii)). Includes Modification #0, dated January 4, 2013; Modification #1 dated February 1, 2013.

SUPERSEDES DECISION WI20070010
U. S. DEPARTMENT OF LABOR
(DAVIS-BACON ACT, MINIMUM WAGE RATES)

STATE: Wisconsin
DECISION NUMBER: W1080010
DATE: February 1, 2013
DESCRIPTION OF WORK: Highways and Airport Runway and Taxiway Construction

LABORERS CLASSIFICATION:	Basic Hourly Rates	Fringe Benefits
Group 1: General Laborer; Tree Trimmer; Conduit Layer; Demolition and Wrecking Laborer; Guard Rail, Fence and Bridge Builder; Landscaper, Multiplate Culvert Assembler; Stone Handler; Bituminous Worker (Shoveler, Loader, Utility Man); Batch Truck Dumper; or Cement Handler; Bituminous Worker; (Dumper, Ironer, Smoother, Tamper); Concrete Handler	$27.20	13.45
Group 2: Air Tool Operator; Joint Sawer and Filler (Pavement); Vibrator or Tamper Operator (Mechanical Hand Operated); Chain Saw Operator; Demolition Burning Torch Laborer	27.30	13.45
Group 3: Bituminous Worker (Raker and Luteman); Formsetter (Curb, Sidewalk, and Pavement); Strike Off man	27.35	13.45
Group 4: Line and Grade Specialist	27.55	13.45
Group 5: Blaster and Powderman	27.40	13.45
Group 6: Flagperson and Traffic Control Person	23.55	13.45

Truck Drivers:	Basic Hourly Rates	Fringe Benefits
1 & 2 Axles	23.16	17.13
Three or More Axles; Euclids, Dumptor & Articulated, Truck Mechanic	23.31	17.13

CLASSES OF LABORER AND MECHANICS

Bricklayer	28.41	12.81
Carpenter	30.48	15.80
Millwright	32.11	15.80
Piledriverman	30.98	15.80
Ironworker	31.25	19.48
Cement Mason/Concrete Finisher	32.09	16.13
Electrician		See Page 3
Line Construction		
Lineman	38.25	18.00
Heavy Equipment Operator	34.43	16.71
Equipment Operator	30.60	15.41
Heavy Groundman Driver	26.78	14.11
Light Groundman Driver	24.86	13.45
Groundsman	21.04	12.16
Painter, Brush	24.50	16.27
Painter, Spray, Structural Steel,Bridges	25.50	16.27
Well Drilling:		
Well Driller	16.52	3.70

Notes: Welders receive rate prescribed for craft performing operation to which welding is incidental. Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29 CFR, 5.5(a)(1)(ii)). Includes Modification #0, dated January 4, 2013; Modification #1 dated February 1, 2013.

SUPERSEDES DECISION WI20070010
U. S. DEPARTMENT OF LABOR
(DAVIS-BACON ACT, MINIMUM WAGE RATES)

STATE: Wisconsin
DECISION NUMBER: W1080010
DESCRIPTION OF WORK: Highways and Airport Runway and Taxiway Construction

DATE: February 1, 2013

POWER EQUIPMENT OPERATORS CLASSIFICATION:	Basic Hourly Rates	Fringe Benefits
Group 1: Cranes, tower cranes and derricks, with or without attachments, with a lifting capacity of over 100 tons or cranes, tower cranes and derricks with boom, leads and/or jib lengths measuring 176 feet or longer	$35.22	$19.65
Group 2: Cranes, tower cranes and derricks, with or without attachments, with a lifting capacity of 100 tons or less or cranes, tower cranes and derricks with boom, leads and/or jib lengths measuring 175 feet or less, and backhoes (excavators) having a manufacturer's rated capacity of 3 cu. yds. and over, caisson rigs, pile driver, dredge operator, dredge engineer.	$34.72	$19.65
Group 3: Mechanic or welder - heavy duty equipment, cranes with a lifting capacity of 25 tons or less, concrete breaker (manual or remote); vibrator/sonic concrete breaker; concrete laser screed; concrete slipform paver; concrete batch plant operator; concrete pavement spreader - heavy duty (rubber tired); concrete spreader and distributor, automatic subgrader (concrete); concrete grinder and planing machine; concrete slipform curb and gutter machine; slipform concrete placer; tube finisher; hydro blaster (10,000 psi and over); bridge paver; concrete conveyor system; concrete pump; stabilizing mixer (self propelled); shoulder widener; asphalt plant engineer; bituminous paver; bump cutter and grooving machine; milling machine; screed (bituminous paver); asphalt heater, planer and scarifier; backhoes (excavators) having a manufacturers rated capacity of under 3 cu. yds.; grader or motor patrol; tractor (scraper, dozer, pusher, loader); scraper - rubber tired (single or twin engine); endloader hydraulic backhoe (tractor-type); trenching machine; skid rigs; tractor, side boom (heavy); drilling or boring machine (mechanical heavy); roller (over 5 tons); percussion or rotary drilling machine; air track; blaster; loading machine (conveyor); tugger; boatmen; winches and A-frames; post driver; material hoist operator.	$34.22	$19.65
Group 4: Greaser, roller steel (5 tons or less); roller (pneumatic tired) - self-propelled; tractor (mounted or towed compactors and light equipment); shouldering machine; self-propelled chip spreader; concrete spreader; finishing machine; mechanical float; curing machine; power subgrader; joint saw (multiple blade) belting machine; burlap machine; texturing machine; tractor, endloader (rubber tired) - light; jeep digger; fork lift; mulcher; launch operator; fireman; environmental burner.	$33.96	$19.65
Group 5: Air compressor; power pack; vibratory hammer and extractor; heavy equipment, leadman; tank car heaters; stump chipper; curb machine operator; concrete pro-portioning plants generators; mudjack operator; rock breaker; crusher or screening plant; screed (milling machine); automatic belt conveyor and surge bin; pug mill operator; oiler; pump (over 3 inches); drilling machine helper.	$33.67	$19.65
Group 6: Off – road material hauler with or without ejector	$27.77	$19.65

Premium Pay:
EPA Level "A" protection - $3.00 per hour
EPA Level "B" protection - $2.00 per hour
EPA Level "C" protection - $1.00 per hours

SUPERSEDES DECISION WI20070010
U. S. DEPARTMENT OF LABOR
(DAVIS-BACON ACT, MINIMUM WAGE RATES)

STATE: Wisconsin
DECISION NUMBER: W1080010
DESCRIPTION OF WORK: Highways and Airport Runway and Taxiway Construction

DATE: February 1, 2013

LABORERS CLASSIFICATION:	Rates	Benefits
Electricians		
Area 1	$27.80	16.52
Area 2:		
Electricians	29.13	17.92
Area 3:		
Electrical contracts under $130,000	26.24	16.85
Electrical contracts over $130,000	29.41	16.97
Area 4:	28.10	17.24
Area 5	28.61	16.60
Area 6	35.25	19.30
Area 8		
Electricians	30.00	17.76
Area 9:		
Electricians	32.94	18.71
Area 10	28.97	19.55
Area 11	31.27	23.12
Area 12	32.87	19.23
Area 13	32.20	21.64
Teledata System Installer		
Area 14		
Installer/Technician	21.89	11.83
Sound & Communications		
Area 15		
Installer	16.47	14.84
Technician	24.75	16.04

Area 1 - CALUMET (except township of New Holstein), GREEN LAKE (N. part, including Townships of Berlin, St. Marie and Seneca), MARQUETTE (N. part, including Townships of Crystal Lake, Neshkoro, Newton & Springfield), OUTAGAMIE, WAUPACA, WAUSHARA and WINNEBAGO COUNTIES.

Area 2 - ASHLAND, BARRON, BAYFIELD, BUFFALO, BURNETT, CHIPPEWA, CLARK (except Mayville, Colby, Unity, Sherman, Fremont, Lynn and Sherwood), CRAWFORD, DUNN, EAU CLAIRE, GRANT, IRON, JACKSON, LA CROSSE, MONROE, PEPIN, PIERCE, POLK, PRICE, RICHLAND, RUSK, ST. CROIX, SAWYER, TAYLOR, TREMPEALEAU, VERNON and WASHBURN COUNTIES

Area 3 - FLORENCE (townships of Aurora, Commonwealth, Fern, Florence and Homestead), MARINETTE (Niagara township)

Area 4 - BROWN, DOOR, KEWAUNEE, MANITOWOC (except Schleswig), MARINETTE (Wausauke and area south thereof), OCONTO, MENOMINEE (East of a line 6 miles West of the West boundary of Oconto County), SHAWANO (except area North of Townships of Aniwa and Hutchins) COUNTIES.

Area 5 - ADAMS, CLARK (Colby, Freemont, Lynn, Mayville, Sherman, Sherwood, Unity), FOREST, JUNEAU, LANGLADE, LINCOLN, MARATHON, MARINETTE (Area North of the town of Wausaukee), MENOMINEE (Area West of a line 6 miles West of the West boundary of Oconto County), ONEIDA, PORTAGE, SHAWANO (Area North of the townships of Aniwa and Hutchins), VILAS AND WOOD COUNTIES

Area 6 - KENOSHA COUNTY

Area 8 - DODGE, (Emmet Township only), GREEN, JEFFERSON, LAFAYETTE, RACINE (Burlington township), ROCK and WALWORTH COUNTIES

Area 9 - COLUMBIA, DANE, DODGE, (area west of Hwy. 26, except Chester & Emmet Townships), GREEN LAKE (except townships of Berlin, Seneca and St. Marie), IOWA, MARQUETTE (except townships of Neshkoka, Crystal Lake, Newton and Springfield), and SAUK COUNTIES

Area 10 - CALUMET (Township of New Holstein), DODGE (East of Hwy. 26 including Chester Township), FOND DU LAC, MANITOWOC (Schleswig), and SHEBOYGAN COUNTIES

Area 11 - DOUGLAS COUNTY

Area 12 - RACINE (except Burlington township) COUNTY

Area 13 - MILWAUKEE, OZAUKEE, WASHINGTON and WAUKESHA COUNTIES

Area 14 - Statewide.

Area 15 - DODGE (East of Hwy 26 including Chester Twp, excluding Emmet Twp), FOND DU LAC (Except Waupun), MILWAUKEE, OZAUKEE, MANITOWOC (Schleswig), WASHINGTON, AND WAUKESHA COUNTIES.

FEBRUARY 1999

NOTICE TO BIDDERS
WAGE RATE DECISION

The wage rate decision of the Secretary of Labor which has been incorporated in these advertised specifications is incomplete in that the classifications may be omitted from the Secretary of Labor's decision.

Since the bidder is responsible, independently, for ascertaining area practice with respect to the necessity, or lack of necessity, for the use of these classifications in the prosecution of the work contemplated by this project, no inference may be drawn from the omision of these classifications concerning prevailing area practices relative to their use. Further, this omission will not, per se, be construed as establishing any governmental liability for increased labor cost if it is subsequently determined that such classifications are required.

There may be omissions and/or errors in the federal wage rates. The bidder is responsible for evaluating and determining the correct applicable rate. The higher of state or federal rate will apply.

SCHEDULE OF ITEMS REVISED:

CONTRACT: 20130514001

PROJECT(S): 1001-03-74, 1001-10-71

FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
	SECTION 0001 ROADWAY					
0010	108.4400 CPM PROGRESS SCHEDULE	5.000 EACH		.		.
0020	201.0105 CLEARING **P**	48.000 STA		.		.
0030	201.0120 CLEARING	25.000 ID		.		.
0040	201.0205 GRUBBING **P**	48.000 STA		.		.
0050	201.0220 GRUBBING	25.000 ID		.		.
0060	203.0100 REMOVING SMALL PIPE CULVERTS	14.000 EACH		.		.
0070	203.0200 REMOVING OLD STRUCTURE (STATION) 001. 147+70'RW', 82' LEFT	LUMP	LUMP			.
0080	203.0200 REMOVING OLD STRUCTURE (STATION) 002. 147+77'RW', 153' LEFT	LUMP	LUMP			.
0090	203.0200 REMOVING OLD STRUCTURE (STATION) 003. 745+55	LUMP	LUMP			.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0100	203.0200 REMOVING OLD STRUCTURE (STATION) 004.757+93	LUMP	LUMP			.
0110	203.0200 REMOVING OLD STRUCTURE (STATION) 005.148+96	LUMP	LUMP			.
0120	203.0225.S DEBRIS CONTAINMENT (STRUCTURE) 001. B-53-31	LUMP	LUMP			.
0130	203.0225.S DEBRIS CONTAINMENT (STRUCTURE) 002. B-53-32	LUMP	LUMP			.
0140	204.0100 REMOVING PAVEMENT **P**	53,300.000 SY		.		.
0150	204.0150 REMOVING CURB & GUTTER **P**	2,050.000 LF		.		.
0160	204.0155 REMOVING CONCRETE SIDEWALK **P**	640.000 SY		.		.
0170	204.0165 REMOVING GUARDRAIL **P**	1,400.000 LF		.		.
0180	204.0170 REMOVING FENCE **P**	1,510.000 LF		.		.
0190	204.0190 REMOVING SURFACE DRAINS	5.000 EACH		.		.
0200	204.0195 REMOVING CONCRETE BASES	18.000 EACH		.		.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0210	204.0210 REMOVING MANHOLES	5.000 EACH		.		.
0220	204.0220 REMOVING INLETS	16.000 EACH		.		.
0230	204.0245 REMOVING STORM SEWER (SIZE) 001. 12-INCH **P**	240.000 LF		.		.
0240	204.0245 REMOVING STORM SEWER (SIZE) 002. 15-INCH **P**	200.000 LF		.		.
0250	204.0245 REMOVING STORM SEWER (SIZE) 003. 18-INCH **P**	175.000 LF		.		.
0260	204.0245 REMOVING STORM SEWER (SIZE) 004. 24-INCH **P**	200.000 LF		.		.
0270	204.0245 REMOVING STORM SEWER (SIZE) 005. 27-INCH **P**	70.000 LF		.		.
0280	204.0245 REMOVING STORM SEWER (SIZE) 006. 36-INCH **P**	690.000 LF		.		.
0290	205.0100 EXCAVATION COMMON	282,942.000 CY		.		.
0300	206.1000 EXCAVATION FOR STRUCTURES BRIDGES (STRUCTURE) 001. B-53-329	LUMP	LUMP			.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0310	206.6000.S TEMPORARY SHORING	766.000 SF		.		.
0320	208.0100 BORROW	114,166.000 CY		.		.
0330	210.0100 BACKFILL STRUCTURE **P**	702.000 CY		.		.
0340	213.0100 FINISHING ROADWAY (PROJECT) 001. 1001-03-74	1.000 EACH		.		.
0350	305.0110 BASE AGGREGATE DENSE 3/4-INCH	1,370.000 TON		.		.
0360	305.0120 BASE AGGREGATE DENSE 1 1/4-INCH	47,600.000 TON		.		.
0370	310.0115 BASE AGGREGATE OPEN GRADED	50.000 CY		.		.
0380	312.0110 SELECT CRUSHED MATERIAL	64,700.000 TON		.		.
0390	415.0080 CONCRETE PAVEMENT 8-INCH **P**	100.000 SY		.		.
0400	415.0085 CONCRETE PAVEMENT 8 1/2-INCH **P**	11,050.000 SY		.		.
0410	415.0095 CONCRETE PAVEMENT 9 1/2-INCH **P**	42,300.000 SY		.		.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0420	415.0210 CONCRETE PAVEMENT GAPS	7.000 EACH		.		.
0430	415.1085 CONCRETE PAVEMENT HES 8 1/2-INCH	310.000 SY		.		.
0440	415.1095 CONCRETE PAVEMENT HES 9 1/2-INCH	930.000 SY		.		.
0450	416.0508 CONCRETE ROUNDABOUT TRUCK APRON 8-INCH	2,130.000 SY		.		.
0460	416.0610 DRILLED TIE BARS	1,150.000 EACH		.		.
0470	416.0620 DRILLED DOWEL BARS	510.000 EACH		.		.
0480	455.0105 ASPHALTIC MATERIAL PG58-28	135.000 TON		.		.
0490	455.0605 TACK COAT	160.000 GAL		.		.
0500	460.1100 HMA PAVEMENT TYPE E-0.3	1,250.000 TON		.		.
0510	460.1103 HMA PAVEMENT TYPE E-3	940.000 TON		.		.
0520	460.2000 INCENTIVE DENSITY HMA PAVEMENT	1,560.000 DOL	1.00000		1560.00	

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0530	465.0125 ASPHALTIC SURFACE TEMPORARY	3,500.000 TON		.		.
0540	465.0315 ASPHALTIC FLUMES	100.000 SY		.		.
0550	502.3200 PROTECTIVE SURFACE TREATMENT **P**	2,831.000 SY		.		.
0560	503.0146 PRESTRESSED GIRDER TYPE I 45W-INCH **P**	3,522.000 LF		.		.
0570	505.0405 BAR STEEL REINFORCEMENT HS BRIDGES	18,280.000 LB		.		.
0580	505.0605 BAR STEEL REINFORCEMENT HS COATED BRIDGES	246,820.000 LB		.		.
0590	506.2605 BEARING PADS ELASTOMERIC NON-LAMINATED **P**	60.000 EACH		.		.
0600	506.4000 STEEL DIAPHRAGMS (STRUCTURE) 001. B-53-329 **P**	56.000 EACH		.		.
0610	513.4090 RAILING TUBULAR SCREENING (STRUCTURE) 001. B-53-329	LUMP	LUMP			.
0620	516.0500 RUBBERIZED MEMBRANE WATERPROOFING **P**	46.000 SY		.		.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0630	517.1010.S CONCRETE STAINING (STRUCTURE) 001. B-53-329	16,049.000 SF		.		.
0640	520.4018 CULVERT PIPE TEMPORARY 18-INCH	200.000 LF		.		.
0650	520.4024 CULVERT PIPE TEMPORARY 24-INCH	255.000 LF		.		.
0660	520.8000 CONCRETE COLLARS FOR PIPE	4.000 EACH		.		.
0670	522.0124 CULVERT PIPE REINFORCED CONCRETE CLASS III 24-INCH	157.000 LF		.		.
0680	522.0130 CULVERT PIPE REINFORCED CONCRETE CLASS III 30-INCH	551.000 LF		.		.
0690	522.0142 CULVERT PIPE REINFORCED CONCRETE CLASS III 42-INCH	431.000 LF		.		.
0700	522.1015 APRON ENDWALLS FOR CULVERT PIPE REINFORCED CONCRETE 15-INCH	1.000 EACH		.		.
0710	522.1018 APRON ENDWALLS FOR CULVERT PIPE REINFORCED CONCRETE 18-INCH	14.000 EACH		.		.
0720	522.1024 APRON ENDWALLS FOR CULVERT PIPE REINFORCED CONCRETE 24-INCH	7.000 EACH		.		.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0730	522.1030 APRON ENDWALLS FOR CULVERT PIPE REINFORCED CONCRETE 30-INCH	6.000 EACH		.		.
0740	522.1036 APRON ENDWALLS FOR CULVERT PIPE REINFORCED CONCRETE 36-INCH	1.000 EACH		.		.
0750	522.1042 APRON ENDWALLS FOR CULVERT PIPE REINFORCED CONCRETE 42-INCH	5.000 EACH		.		.
0760	550.0010 PRE-BORING UNCONSOLIDATED MATERIALS	357.000 LF		.		.
0770	550.2126 PILING CIP CONCRETE 12 3/4 X 0. 375-INCH	6,505.000 LF		.		.
0780	601.0105 CONCRETE CURB TYPE A **P**	240.000 LF		.		.
0790	601.0405 CONCRETE CURB & GUTTER 18-INCH TYPE A **P**	680.000 LF		.		.
0800	601.0409 CONCRETE CURB & GUTTER 30-INCH TYPE A **P**	8,750.000 LF		.		.
0810	601.0555 CONCRETE CURB AND GUTTER 6-INCH SLOPED 36-INCH TYPE A **P**	13,100.000 LF		.		.
0820	601.0580 CONCRETE CURB & GUTTER 4-INCH SLOPED 36-INCH TYPE R **P**	690.000 LF		.		.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0830	601.0600 CONCRETE CURB PEDESTRIAN **P**	65.000 LF		.		.
0840	602.0410 CONCRETE SIDEWALK 5-INCH **P**	24,400.000 SF		.		.
0850	602.0505 CURB RAMP DETECTABLE WARNING FIELD YELLOW **P**	480.000 SF		.		.
0860	603.8000 CONCRETE BARRIER TEMPORARY PRECAST DELIVERED	3,800.000 LF		.		.
0870	603.8125 CONCRETE BARRIER TEMPORARY PRECAST INSTALLED	5,500.000 LF		.		.
0880	604.0400 SLOPE PAVING CONCRETE **P**	584.000 SY		.		.
0890	606.0200 RIPRAP MEDIUM	550.000 CY		.		.
0900	606.0300 RIPRAP HEAVY	380.000 CY		.		.
0910	608.0312 STORM SEWER PIPE REINFORCED CONCRETE CLASS III 12-INCH	64.000 LF		.		.
0920	608.0315 STORM SEWER PIPE REINFORCED CONCRETE CLASS III 15-INCH	1,230.000 LF		.		.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
0930	608.0318 STORM SEWER PIPE REINFORCED CONCRETE CLASS III 18-INCH	1,960.000 LF		.		.
0940	608.0324 STORM SEWER PIPE REINFORCED CONCRETE CLASS III 24-INCH	1,303.000 LF		.		.
0950	608.0336 STORM SEWER PIPE REINFORCED CONCRETE CLASS III 36-INCH	188.000 LF		.		.
0960	608.0342 STORM SEWER PIPE REINFORCED CONCRETE CLASS III 42-INCH	305.000 LF		.		.
0970	611.0420 RECONSTRUCTING MANHOLES	3.000 EACH		.		.
0980	611.0530 MANHOLE COVERS TYPE J	3.000 EACH		.		.
0990	611.0612 INLET COVERS TYPE C	1.000 EACH		.		.
1000	611.0624 INLET COVERS TYPE H	32.000 EACH		.		.
1010	611.0627 INLET COVERS TYPE HM	47.000 EACH		.		.
1020	611.0639 INLET COVERS TYPE H-S	5.000 EACH		.		.
1030	611.0642 INLET COVERS TYPE MS	1.000 EACH		.		.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1040	611.0652 INLET COVERS TYPE T	5.000 EACH		.		.
1050	611.2004 MANHOLES 4-FT DIAMETER	11.000 EACH		.		.
1060	611.2006 MANHOLES 6-FT DIAMETER	2.000 EACH		.		.
1070	611.3230 INLETS 2X3-FT	79.000 EACH		.		.
1080	611.3901 INLETS MEDIAN 1 GRATE	1.000 EACH		.		.
1090	611.8110 ADJUSTING MANHOLE COVERS	3.000 EACH		.		.
1100	611.8115 ADJUSTING INLET COVERS	6.000 EACH		.		.
1110	611.8120.S COVER PLATES TEMPORARY	7.000 EACH		.		.
1120	611.9800.S PIPE GRATES 001. 36-INCH	1.000 EACH		.		.
1130	611.9800.S PIPE GRATES 002. 42-INCH	1.000 EACH		.		.
1140	612.0406 PIPE UNDERDRAIN WRAPPED 6-INCH	2,190.000 LF		.		.

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PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1150	614.0150 ANCHOR ASSEMBLIES FOR STEEL PLATE BEAM GUARD **P**	2.000 EACH		.		.
1160	614.0220 STEEL THRIE BEAM BULLNOSE TERMINAL	2.000 EACH		.		.
1170	614.0230 STEEL THRIE BEAM	240.000 LF		.		.
1180	614.0905 CRASH CUSHIONS TEMPORARY	4.000 EACH		.		.
1190	614.1000 MGS GUARDRAIL TEMPORARY	70.000 LF		.		.
1200	614.1100 MGS GUARDRAIL TEMPORARY THRIE BEAM TRANSITION	40.000 LF		.		.
1210	614.1200 MGS GUARDRAIL TEMPORARY TRANSITION EAT	1.000 EACH		.		.
1220	614.2500 MGS THRIE BEAM TRANSITION	40.000 LF		.		.
1230	614.2610 MGS GUARDRAIL TERMINAL EAT	1.000 EACH		.		.
1240	616.0100 FENCE WOVEN WIRE (HEIGHT) 001. 4 FT **P**	1,500.000 LF		.		.
1250	616.0700.S FENCE SAFETY	2,500.000 LF		.		.

CONTRACT: 20130514001
PROJECT(S): 1001-03-74, 1001-10-71
FEDERAL ID(S): WISC 2013260, N/A

CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1260	619.1000 MOBILIZATION	1.000 EACH		.		.
1270	620.0300 CONCRETE MEDIAN SLOPED NOSE **P**	740.000 SF		.		.
1280	624.0100 WATER	1,590.000 MGAL		.		.
1290	625.0500 SALVAGED TOPSOIL	220,000.000 SY		.		.
1300	627.0200 MULCHING	188,400.000 SY		.		.
1310	628.1504 SILT FENCE	2,350.000 LF		.		.
1320	628.1520 SILT FENCE MAINTENANCE	1,175.000 LF		.		.
1330	628.1905 MOBILIZATIONS EROSION CONTROL	11.000 EACH		.		.
1340	628.1910 MOBILIZATIONS EMERGENCY EROSION CONTROL	5.000 EACH		.		.
1350	628.2004 EROSION MAT CLASS I TYPE B	35,610.000 SY		.		.
1360	628.2006 EROSION MAT URBAN CLASS I TYPE A	32,500.000 SY		.		.

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1370	628.2023 EROSION MAT CLASS II TYPE B	4,000.000 SY		.		.
1380	628.6510 SOIL STABILIZER TYPE B	23.000 ACRE		.		.
1390	628.7005 INLET PROTECTION TYPE A	110.000 EACH		.		.
1400	628.7010 INLET PROTECTION TYPE B	5.000 EACH		.		.
1410	628.7015 INLET PROTECTION TYPE C	110.000 EACH		.		.
1420	628.7020 INLET PROTECTION TYPE D	20.000 EACH		.		.
1430	628.7504 TEMPORARY DITCH CHECKS	660.000 LF		.		.
1440	628.7555 CULVERT PIPE CHECKS	15.000 EACH		.		.
1450	629.0210 FERTILIZER TYPE B	140.000 CWT		.		.
1460	630.0120 SEEDING MIXTURE NO. 20	3,800.000 LB		.		.
1470	630.0140 SEEDING MIXTURE NO. 40	730.000 LB		.		.

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1480	630.0175 SEEDING MIXTURE NO. 75	15.000 LB		.		.
1490	630.0200 SEEDING TEMPORARY	5,950.000 LB		.		.
1500	632.0101 TREES (SPECIES, ROOT, SIZE) 001. GINKO 'PRINCETON SENTRY' B&B 2-INCH CAL.	5.000 EACH		.		.
1510	632.0101 TREES (SPECIES, ROOT, SIZE) 002. HACKBERRY 'WINDY CITY' B&B 2 1/2-INCH CAL.	10.000 EACH		.		.
1520	632.0101 TREES (SPECIES, ROOT, SIZE) 003. MAPLE 'STATE STREET' B&B 2 1/2-INCH CAL.	39.000 EACH		.		.
1530	632.0101 TREES (SPECIES, ROOT, SIZE) 004. OAK 'REGAL PRINCE' B&B 2-INCH CAL	11.000 EACH		.		.
1540	632.0101 TREES (SPECIES, ROOT, SIZE) 005. PEAR 'CLEVELAND SELECT' B&B 2-INCH CAL.	18.000 EACH		.		.
1550	632.0101 TREES (SPECIES, ROOT, SIZE) 006. CRABAPPLE 'PURPLE PRINCE' (SHRUB FORM TREE) B&B 8-FT HT	11.000 EACH		.		.

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1560	632.0101 TREES (SPECIES, ROOT, SIZE) 007. HAWTHORN 'WINTER KING' (SHRUB FORM TREE) B&B 8-FT HT	6.000 EACH		.		.
1570	632.0101 TREES (SPECIES, ROOT, SIZE) 008. LILAC JAPANESE TREE (SHRUB FORM TREE) B&B 8-FT HT	10.000 EACH		.		.
1580	632.0201 SHRUBS (SPECIES, ROOT, SIZE) 001. JUNIPER PFITZER 'KALLAY'S COMPACT' CG 24-INCH SPREAD	127.000 EACH		.		.
1590	632.0201 SHRUBS (SPECIES, ROOT, SIZE) 002. NINEBARK 'SUMMER WINE' CG 36-INCH HT	24.000 EACH		.		.
1600	632.0201 SHRUBS (SPECIES, ROOT, SIZE) 003. ROS, RUGOSA 'FRAU DAGMAR HASTRUP' CG 24-INCH HT	44.000 EACH		.		.
1610	632.0201 SHRUBS (SPECIES, ROOT, SIZE) 004. SUMA 'PRAIRIE FLAME' CG 36-INCH HT	5.000 EACH		.		.
1620	632.9101 LANDSCAPE PLANTING SURVEILLANCE AND CARE CYCLES	26.000 EACH		.		.
1630	633.0100 DELINEATOR POSTS STEEL	35.000 EACH		.		.
1640	633.0500 DELINEATOR REFLECTORS	40.000 EACH		.		.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1650	633.5200 MARKERS CULVERT END	34.000 EACH		.		.
1660	634.0612 POSTS WOOD 4X6-INCH X 12-FT	22.000 EACH		.		.
1670	634.0614 POSTS WOOD 4X6-INCH X 14-FT	30.000 EACH		.		.
1680	634.0616 POSTS WOOD 4X6-INCH X 16-FT	72.000 EACH		.		.
1690	634.0618 POSTS WOOD 4X6-INCH X 18-FT	24.000 EACH		.		.
1700	634.0620 POSTS WOOD 4X6-INCH X 20-FT	16.000 EACH		.		.
1710	635.0200 SIGN SUPPORTS STRUCTURAL STEEL HS	1,043.000 LB		.		.
1720	636.0100 SIGN SUPPORTS CONCRETE MASONRY	1.600 CY		.		.
1730	636.0500 SIGN SUPPORTS STEEL REINFORCEMENT	98.000 LB		.		.
1740	637.0101 SIGNS TYPE I	1,669.500 SF		.		.
1750	637.0202 SIGNS REFLECTIVE TYPE II	1,818.960 SF		.		.

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1760	637.0402 SIGNS REFLECTIVE FOLDING TYPE II	49.000 SF		.		.
1770	638.2102 MOVING SIGNS TYPE II	22.000 EACH		.		.
1780	638.2601 REMOVING SIGNS TYPE I	14.000 EACH		.		.
1790	638.2602 REMOVING SIGNS TYPE II	82.000 EACH		.		.
1800	638.3000 REMOVING SMALL SIGN SUPPORTS	92.000 EACH		.		.
1810	638.3210 REVISING SIGNS TYPE I	6.000 EACH		.		.
1820	638.4000 MOVING SMALL SIGN SUPPORTS	14.000 EACH		.		.
1830	641.8100 OVERHEAD SIGN SUPPORT (STRUCTURE) 001. B-53-64	LUMP	LUMP			.
1840	641.8100 OVERHEAD SIGN SUPPORT (STRUCTURE) 002. B-53-65	LUMP	LUMP			.
1850	641.8100 OVERHEAD SIGN SUPPORT (STRUCTURE) 003. B-53-66	LUMP	LUMP			.

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1860	641.8100 OVERHEAD SIGN SUPPORT (STRUCTURE) 004. B-53-67	LUMP	LUMP			.
1870	641.8100 OVERHEAD SIGN SUPPORT (STRUCTURE) 005. S-53-63	LUMP	LUMP			.
1880	642.5201 FIELD OFFICE TYPE C	1.000 EACH	.			.
1890	643.0100 TRAFFIC CONTROL (PROJECT) 001. 1001-03-74	1.000 EACH	.			.
1900	643.0300 TRAFFIC CONTROL DRUMS	79,900.000 DAY	.			.
1910	643.0410 TRAFFIC CONTROL BARRICADES TYPE II	1,450.000 DAY	.			.
1920	643.0420 TRAFFIC CONTROL BARRICADES TYPE III	10,750.000 DAY	.			.
1930	643.0500 TRAFFIC CONTROL FLEXIBLE TUBULAR MARKER POSTS	240.000 EACH	.			.
1940	643.0600 TRAFFIC CONTROL FLEXIBLE TUBULAR MARKER BASES	240.000 EACH	.			.
1950	643.0705 TRAFFIC CONTROL WARNING LIGHTS TYPE A	18,800.000 DAY	.			.
1960	643.0715 TRAFFIC CONTROL WARNING LIGHTS TYPE C	19,600.000 DAY	.			.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
1970	643.0800 TRAFFIC CONTROL ARROW BOARDS	240.000 DAY		.		.
1980	643.0900 TRAFFIC CONTROL SIGNS	24,950.000 DAY		.		.
1990	643.0920 TRAFFIC CONTROL COVERING SIGNS TYPE II	20.000 EACH		.		.
2000	643.1000 TRAFFIC CONTROL SIGNS FIXED MESSAGE	126.000 SF		.		.
2010	643.1050 TRAFFIC CONTROL SIGNS PCMS	650.000 DAY		.		.
2020	645.0120 GEOTEXTILE FABRIC TYPE HR	600.000 SY		.		.
2030	645.0130 GEOTEXTILE FABRIC TYPE R	810.000 SY		.		.
2040	646.0106 PAVEMENT MARKING EPOXY 4-INCH **P**	24,250.000 LF		.		.
2050	646.0126 PAVEMENT MARKING EPOXY 8-INCH **P**	1,600.000 LF		.		.
2060	646.0600 REMOVING PAVEMENT MARKINGS	5,700.000 LF		.		.

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2070	646.0841.S PAVEMENT MARKING GROOVED WET REFLECTIVE CONTRAST TAPE 4-INCH **P**	2,400.000 LF		.		.
2080	646.0843.S PAVEMENT MARKING GROOVED WET REFLECTIVE CONTRAST TAPE 8-INCH **P**	8,650.000 LF		.		.
2090	647.0166 PAVEMENT MARKING ARROWS EPOXY TYPE 2	19.000 EACH		.		.
2100	647.0356 PAVEMENT MARKING WORDS EPOXY	10.000 EACH		.		.
2110	647.0456 PAVEMENT MARKING CURB EPOXY **P**	150.000 LF		.		.
2120	647.0566 PAVEMENT MARKING STOP LINE EPOXY 18-INCH **P**	375.000 LF		.		.
2130	647.0606 PAVEMENT MARKING ISLAND NOSE EPOXY	6.000 EACH		.		.
2140	647.0726 PAVEMENT MARKING DIAGONAL EPOXY 12-INCH **P**	200.000 LF		.		.
2150	647.0746 PAVEMENT MARKING DIAGONAL EPOXY 24-INCH **P**	500.000 LF		.		.
2160	647.0766 PAVEMENT MARKING CROSSWALK EPOXY 6-INCH **P**	1,450.000 LF		.		.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2170	647.0955 REMOVING PAVEMENT MARKINGS ARROWS	2.000 EACH		.		.
2180	647.0965 REMOVING PAVEMENT MARKINGS WORDS	2.000 EACH		.		.
2190	649.0200 TEMPORARY PAVEMENT MARKING REFLECTIVE PAINT 4-INCH	25,300.000 LF		.		.
2200	649.0300 TEMPORARY PAVEMENT MARKING REFLECTIVE TAPE 4-INCH	50,800.000 LF		.		.
2210	649.1200 TEMPORARY PAVEMENT MARKING STOP LINE REMOVABLE TAPE 18-INCH	830.000 LF		.		.
2220	649.1700 TEMPORARY PAVEMENT MARKING ARROWS	25.000 EACH		.		.
2230	649.1800 TEMPORARY PAVEMENT MARKING ARROWS REMOVABLE TAPE	45.000 EACH		.		.
2240	649.1900 TEMPORARY PAVEMENT MARKING WORDS	15.000 EACH		.		.
2250	649.2000 TEMPORARY PAVEMENT MARKING WORDS REMOVABLE TAPE	15.000 EACH		.		.
2260	652.0125 CONDUIT RIGID METALLIC 2-INCH	627.000 LF		.		.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2270	652.0225 CONDUIT RIGID NONMETALLIC SCHEDULE 40 2-INCH	11,165.000 LF		.		.
2280	652.0235 CONDUIT RIGID NONMETALLIC SCHEDULE 40 3-INCH	2,858.000 LF		.		.
2290	652.0800 CONDUIT LOOP DETECTOR	554.000 LF		.		.
2300	653.0135 PULL BOXES STEEL 24X36-INCH	5.000 EACH		.		.
2310	653.0140 PULL BOXES STEEL 24X42-INCH	46.000 EACH		.		.
2320	653.0180 PULL BOXES STEEL COMMUNICATIONS (INCH) 001. 24X42-INCH	8.000 EACH		.		.
2330	653.0220 JUNCTION BOXES 18X6X6-INCH **P**	8.000 EACH		.		.
2340	653.0900 ADJUSTING PULL BOXES	1.000 EACH		.		.
2350	653.0905 REMOVING PULL BOXES	14.000 EACH		.		.
2360	654.0101 CONCRETE BASES TYPE 1	6.000 EACH		.		.
2370	654.0102 CONCRETE BASES TYPE 2	2.000 EACH		.		.

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2380	654.0105 CONCRETE BASES TYPE 5	6.000 EACH		.		.
2390	654.0106 CONCRETE BASES TYPE 6	38.000 EACH		.		.
2400	654.0113 CONCRETE BASES TYPE 13	1.000 EACH		.		.
2410	654.0217 CONCRETE CONTROL CABINET BASES TYPE 9 SPECIAL	1.000 EACH		.		.
2420	655.0230 CABLE TRAFFIC SIGNAL 5-14 AWG	816.000 LF		.		.
2430	655.0240 CABLE TRAFFIC SIGNAL 7-14 AWG	1,062.000 LF		.		.
2440	655.0260 CABLE TRAFFIC SIGNAL 12-14 AWG	2,596.000 LF		.		.
2450	655.0270 CABLE TRAFFIC SIGNAL 15-14 AWG	253.000 LF		.		.
2460	655.0305 CABLE TYPE UF 2-12 AWG GROUNDED	1,901.000 LF		.		.
2470	655.0515 ELECTRICAL WIRE TRAFFIC SIGNALS 10 AWG	2,703.000 LF		.		.
2480	655.0610 ELECTRICAL WIRE LIGHTING 12 AWG	10,629.000 LF		.		.

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2490	655.0615 ELECTRICAL WIRE LIGHTING 10 AWG	5,823.000 LF		.		.
2500	655.0625 ELECTRICAL WIRE LIGHTING 6 AWG	7,275.000 LF		.		.
2510	655.0630 ELECTRICAL WIRE LIGHTING 4 AWG	38,490.000 LF		.		.
2520	655.0635 ELECTRICAL WIRE LIGHTING 2 AWG	2,457.000 LF		.		.
2530	655.0700 LOOP DETECTOR LEAD IN CABLE	4,001.000 LF		.		.
2540	655.0800 LOOP DETECTOR WIRE	1,904.000 LF		.		.
2550	655.0900 TRAFFIC SIGNAL EVP DETECTOR CABLE	444.000 LF		.		.
2560	656.0200 ELECTRICAL SERVICE METER BREAKER PEDESTAL (LOCATION) 001. CB200	LUMP	LUMP			.
2570	656.0200 ELECTRICAL SERVICE METER BREAKER PEDESTAL (LOCATION) 003. CB1	LUMP	LUMP			.
2580	656.0500 ELECTRICAL SERVICE BREAKER DISCONNECT BOX (LOCATION) 001. CCTV-53-0029	LUMP	LUMP			.

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CONTRACTOR :_____

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE DOLLARS	UNIT PRICE CTS	BID AMOUNT DOLLARS	BID AMOUNT CTS
2590	657.0255 TRANSFORMER BASES BREAKAWAY 11 1/2-INCH BOLT CIRCLE	42.000 EACH		.		.
2600	657.0327 POLES TYPE 6-ALUMINUM	42.000 EACH		.		.
2610	657.0610 LUMINAIRE ARMS SINGLE MEMBER 4 1/2-INCH CLAMP 6-FT	4.000 EACH		.		.
2620	657.0709 LUMINAIRE ARMS TRUSS TYPE 4-INCH CLAMP 12-FT	2.000 EACH		.		.
2630	657.0710 LUMINAIRE ARMS TRUSS TYPE 4 1/2-INCH CLAMP 12-FT	57.000 EACH		.		.
2640	657.1540 INSTALL MONOTUBE ARMS 40-FT	1.000 EACH		.		.
2650	657.6005.S ANCHOR ASSEMBLIES LIGHT POLES ON STRUCTURES **P**	4.000 EACH		.		.
2660	659.0125 LUMINAIRES UTILITY HPS 250 WATTS	63.000 EACH		.		.
2670	659.0802 PLAQUES SEQUENCE IDENTIFICATION	2.000 EACH		.		.
2680	661.0200 TEMPORARY TRAFFIC SIGNALS FOR INTERSECTIONS (LOCATION) 001. STH 11 & MIDLAND RD	LUMP	LUMP			.

CONTRACT: 20130514001
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2690	661.0200 TEMPORARY TRAFFIC SIGNALS FOR INTERSECTIONS (LOCATION) 002. STH 11 & TEMP NB RAMP - STAGE 2	LUMP	LUMP			.
2700	661.0200 TEMPORARY TRAFFIC SIGNALS FOR INTERSECTIONS (LOCATION) 003. STH 11 & TEMP NB RAMP - STAGE 3	LUMP	LUMP			.
2710	661.0200 TEMPORARY TRAFFIC SIGNALS FOR INTERSECTIONS (LOCATION) 004. STH 11 & TEMP SB RAMP - STAGE 2	LUMP	LUMP			.
2720	661.0200 TEMPORARY TRAFFIC SIGNALS FOR INTERSECTIONS (LOCATION) 005. STH 11 & TEMP SB RAMP - STAGE 3	LUMP	LUMP			.
2730	661.0200 TEMPORARY TRAFFIC SIGNALS FOR INTERSECTIONS (LOCATION) 006. RACINE ST & PALMER DR	LUMP	LUMP			.
2740	670.0100 FIELD SYSTEM INTEGRATOR	LUMP	LUMP			.
2750	670.0200 ITS DOCUMENTATION	LUMP	LUMP			.
2760	672.0250 BASE CAMERA POLE 50-FT	1.000 EACH	.			.

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PROJECT(S): 1001-03-74, 1001-10-71
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CONTRACTOR :_____

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2770	673.0105 COMMUNICATION VAULT TYPE 1	1.000 EACH		.		.
2780	673.0225.S INSTALL POLE MOUNTED CABINET	1.000 EACH		.		.
2790	675.0400.S INSTALL ETHERNET SWITCH	1.000 EACH		.		.
2800	677.0100 INSTALL CAMERA POLE	1.000 EACH		.		.
2810	677.0200 INSTALL CAMERA ASSEMBLY	1.000 EACH		.		.
2820	677.0300.S INSTALL VIDEO ENCODER	1.000 EACH		.		.
2830	678.0500 COMMUNICATION SYSTEM TESTING	LUMP	LUMP			.
2840	690.0150 SAWING ASPHALT	470.000 LF		.		.
2850	690.0250 SAWING CONCRETE	2,200.000 LF		.		.
2860	715.0415 INCENTIVE STRENGTH CONCRETE PAVEMENT	17,100.000 DOL	1.00000		17100.00	

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2870	715.0502 INCENTIVE STRENGTH CONCRETE STRUCTURES	9,432.000 DOL	1.00000		9432.00	
2880	ASP.1T0A ON-THE-JOB TRAINING APPRENTICE AT $5.00/HR	1,750.000 HRS	5.00000		8750.00	
2890	ASP.1T0G ON-THE-JOB TRAINING GRADUATE AT $5.00/HR	1,000.000 HRS	5.00000		5000.00	
2900	SPV.0005 SPECIAL 001. SUBSOILING	7.200 ACRE	.		.	
2910	SPV.0035 SPECIAL 500. PLANTING MIXTURE	2,530.000 CY	.		.	
2920	SPV.0035 SPECIAL 501. TOPSOIL SPECIAL	415.000 CY	.		.	
2930	SPV.0035 SPECIAL 700. HIGH PERFORMANCE CONCRETE (HPC) MASONRY STRUCTURES **P**	1,572.000 CY	.		.	
2940	SPV.0045 SPECIAL 200. TEMPORARY CROSSWALK ACCESS	400.000 DAY	.		.	
2950	SPV.0060 SPECIAL 100. MANHOLE 4-FT DIA. SPECIAL	4.000 EACH	.		.	
2960	SPV.0060 SPECIAL 101. INLET COVERS TYPE D-H	3.000 EACH	.		.	

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2970	SPV.0060 SPECIAL 150. SEDIMENTATION BASIN	5.000 EACH		.		.
2980	SPV.0060 SPECIAL 300. PAVEMENT MARKING GROOVED CONTRAST PREFORMED THERMOPLASTIC ARROWS TYPE 1	14.000 EACH		.		.
2990	SPV.0060 SPECIAL 301. PAVEMENT MARKING GROOVED CONTRAST PREFORMED THERMOPLASTIC ARROWS TYPE 2	6.000 EACH		.		.
3000	SPV.0060 SPECIAL 302. PAVEMENT MARKING GROOVED CONTRAST PREFORMED THERMOPLASTIC ARROWS TYPE 2R	3.000 EACH		.		.
3010	SPV.0060 SPECIAL 303. PAVEMENT MARKING GROOVED CONTRAST PREFORMED THERMOPLASTIC ARROWS TYPE 3	11.000 EACH		.		.
3020	SPV.0060 SPECIAL 304. PAVEMENT MARKING GROOVED CONTRAST PREFORMED THERMOPLASTIC ARROWS TYPE 3R	5.000 EACH		.		.
3030	SPV.0060 SPECIAL 305. PAVEMENT MARKING GROOVED CONTRAST PREFORMED THERMOPLASTIC WORDS	14.000 EACH		.		.
3040	SPV.0060 SPECIAL 350. LIGHTING CONTROL CABINET	1.000 EACH		.		.

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3050	SPV.0060 SPECIAL 351. REMOVE STREET LIGHT	5.000 EACH		.		.
3060	SPV.0060 SPECIAL 352. REINSTALL STREET LIGHT	2.000 EACH		.		.
3070	SPV.0060 SPECIAL 353. RAMP CLOSURE GATES HARDWIRED 24-FT	1.000 EACH		.		.
3080	SPV.0060 SPECIAL 354. RAMP CLOSURE GATES HARDWIRED 28-FT	2.000 EACH		.		.
3090	SPV.0060 SPECIAL 355. RAMP CLOSURE GATES HARDWIRED 30-FT	1.000 EACH		.		.
3100	SPV.0060 SPECIAL 356. RAMP CLOSURE GATE ARMS STOCKPILE 24-FT	1.000 EACH		.		.
3110	SPV.0060 SPECIAL 357. RAMP CLOSURE GATE ARMS STOCKPILE 28-FT	2.000 EACH		.		.
3120	SPV.0060 SPECIAL 358. RAMP CLOSURE GATE ARMS STOCKPILE 30-FT	1.000 EACH		.		.
3130	SPV.0060 SPECIAL 359. CONCRETE CONTROL CABINET BASE TYPE SPECIAL	1.000 EACH		.		.
3140	SPV.0060 SPECIAL 400. REMOVE ELECTRICAL SERVICE METER BREAKER PEDESTAL	1.000 EACH		.		.

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3150	SPV.0060 SPECIAL 401. REMOVE 50-FOOT CAMERA POLE WITH LOWERING SYSTEM	1.000 EACH		.		.
3160	SPV.0060 SPECIAL 402. SALVAGE ITS FIELD CABINET	1.000 EACH		.		.
3170	SPV.0060 SPECIAL 403. SALVAGE IP RADIO	1.000 EACH		.		.
3180	SPV.0060 SPECIAL 404. SALVAGE CAMERA ASSEMBLY	1.000 EACH		.		.
3190	SPV.0060 SPECIAL 405. SALVAGE VIDEO ENCODER	1.000 EACH		.		.
3200	SPV.0060 SPECIAL 406. SALAVAGE TYPE 5 POLE	1.000 EACH		.		.
3210	SPV.0060 SPECIAL 407. SALVAGE TRANSFORMER BASE	1.000 EACH		.		.
3220	SPV.0060 SPECIAL 408. SALAVAGE MOUNTED CONTROLLER MICROWAVE DETECTOR ASSEMBLY	1.000 EACH		.		.
3230	SPV.0060 SPECIAL 500. FEATHER REED GRASS 'KARL FORESTER' CG 1-GAL	890.000 EACH		.		.
3240	SPV.0060 SPECIAL 501. LITTLE BLUESTEM 'BLUE HEAVEN' CG 1-GAL	285.000 EACH		.		.

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3250	SPV.0060 SPECIAL 502. PRAIRIE DROPSEED CG 1-GAL	966.000 EACH		.		.
3260	SPV.0060 SPECIAL 503. SWITCH GRASS 'NORTHWIND' 1-GAL	137.000 EACH		.		.
3270	SPV.0060 SPECIAL 504. SWITCH GRASS 'SHENANDOAH' CG 1-GAL	182.000 EACH		.		.
3280	SPV.0060 SPECIAL 650. ADJUSTING WATER VALVES	3.000 EACH		.		.
3290	SPV.0060 SPECIAL 700. DECORATIVE MEDALLION B-53-329 **P**	4.000 EACH		.		.
3300	SPV.0060 SPECIAL 701. MEDALLION CONCRETE STAINING B-53-329 **P**	4.000 EACH		.		.
3310	SPV.0085 SPECIAL 001. WET PRAIRIE NATIVE SEED MIX	130.000 LB		.		.
3320	SPV.0085 SPECIAL 002. SEEDING NURSE CROP	250.000 LB		.		.
3330	SPV.0090 SPECIAL 001. PATH RUB RAIL	70.000 LF		.		.
3340	SPV.0090 SPECIAL 002. SPLIT RAIL WOODEN FENCE THREE RAILS	450.000 LF		.		.
3350	SPV.0090 SPECIAL 003. DECORATIVE RAILING	370.000 LF		.		.

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3360	SPV.0090 SPECIAL 004. CONCRETE CURB & GUTTER 24-INCH **P**	45.000 LF		.		.
3370	SPV.0090 SPECIAL 005. CONCRETE CURB & GUTTER OSOW **P**	840.000 LF		.		.
3380	SPV.0090 SPECIAL 006. CONCRETE CURB & GUTTER 2-INCH SLOPED 36-INCH TYPE R **P**	210.000 LF		.		.
3390	SPV.0090 SPECIAL 300. PM GROOVED CONTRAST PREFORMED THERMOPLASTIC YIELD LINE 18-INCH **P**	250.000 LF		.		.
3400	SPV.0090 SPECIAL 301. PM GROOVED CONTRAST PREFORMED THERMOPLASTIC CROSSWALK 6-INCH **P**	375.000 LF		.		.
3410	SPV.0090 SPECIAL 302. PAVEMENT MARKING CONTRAST GROOVED PREFORMED THERMOPLASTIC 8-INCH **P**	700.000 LF		.		.
3420	SPV.0090 SPECIAL 303. PAVEMENT MARKING GROOVED WET REFLECTIVE CONTRAST TAPE 12-INCH **P**	400.000 LF		.		.
3430	SPV.0090 SPECIAL 500. SHOVEL CUT EDGING	1,715.000 LF		.		.
3440	SPV.0105 SPECIAL 001. CONCRETE PAVEMENT JOINT LAYOUT	LUMP	LUMP			.

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3450	SPV.0105 SPECIAL 002. SURVEY PROJECT 1001-03-74	LUMP	LUMP			.
3460	SPV.0105 SPECIAL 360. ELECTRICAL SERVICE METER BREAKER PEDESTAL SPECIAL (CB100)	LUMP	LUMP			.
3470	SPV.0105 SPECIAL 450. REMOVE AND REINSTALL TRAFFIC SIGNALS (RACINE ST & PALMER DR)	LUMP	LUMP			.
3480	SPV.0105 SPECIAL 451. REMOVE AND REINSTALL TRAFFIC SIGNALS (STH 11 & MIDLAND RD)	LUMP	LUMP			.
3490	SPV.0105 SPECIAL 452. TEMPORARY VEHICLE DETECTION (STH 11 & MIDLAND ROAD)	LUMP	LUMP			.
3500	SPV.0105 SPECIAL 453. TEMPORARY VEHICLE DETECTION (STH 11 & TEMP NB RAMP - STAGE 2)	LUMP	LUMP			.
3510	SPV.0105 SPECIAL 454. TEMPORARY VEHICLE DETECTION (STH 11 & TEMP NB RAMP - STAGE 3)	LUMP	LUMP			.
3520	SPV.0105 SPECIAL 455. TEMPORARY VEHICLE DETECTION (STH 11 & TEMP SB RAMP - STAGE 2)	LUMP	LUMP			.

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3530	SPV.0105 SPECIAL 456. TEMPORARY VEHICLE DETECTION (STH 11 & TEMP SB RAMP - STAGE 3)	LUMP	LUMP			.
3540	SPV.0105 SPECIAL 457. TEMPORARY VEHICLE DETECTION (RACINE ST & PALMER DR)	LUMP	LUMP			.
3550	SPV.0105 SPECIAL 600. BUILDING RENOVATION, GENERAL CONSTRUCTION	LUMP	LUMP			.
3560	SPV.0105 SPECIAL 601. BUILDING RENOVATION, PLUMBING	LUMP	LUMP			.
3570	SPV.0105 SPECIAL 602. BUILDING RENOVATION, HEATING AND VENTILATION	LUMP	LUMP			.
3580	SPV.0105 SPECIAL 603. BUILDING RENOVATION, ELECTRICAL	LUMP	LUMP			.
3590	SPV.0165 SPECIAL 001. STORMWATER TREATMENT FILTER STRIPS	22,000.000 SF	.			.
3600	SPV.0165 SPECIAL 500. COLORED CONCRETE SIDEWALK 5-INCH	11,250.000 SF	.			.
3610	SPV.0165 SPECIAL 700. ARCHITECTURAL SURFACE TREATMENT	8,092.000 SF	.			.
3620	SPV.0180 SPECIAL 500. SHREDDED HARDWOOD BARK MULCH	2,255.000 SY	.			.
	SECTION 0001 TOTAL					.
	TOTAL BID					.

PLEASE ATTACH SCHEDULE OF ITEMS HERE