



CALL TO ORDER

PLEDGE OF ALLEGIANCE

ROLL CALL

PUBLIC MEETING NOTICE

APPROVAL OF MINUTES

Finance Committee Meeting Minutes - June 27, 2023
[FCM.2023.06.27.docx](#)

LICENSE APPROVALS

Recommend Approval of Change of Agent (Josephine Czubernat) for the "Class A" liquor license held by Walgreen Co (dba Walgreens #11636) located at S70W15775 Janesville Rd.

Recommend Approval of Change of Agent (Graham W. Serchen) for the "Class A" liquor license held by Kwik Trip, Inc. (dba Kwik Trip #1080) located at S63W13510 Janesville Rd.

Recommend Approval of a "Class B" Liquor License to Sobek's Bar LLC (dba Sobeks) located at S79W16419 Woods Road

Recommend Approval of a Class "A" Liquor License to Fleet Farm Group LLC (dba Fleet Farm) located at W195S6460 Racine Avenue

Recommend Approval of a Class "A" Liquor License to Fleet Farm Group LLC (dba Fleet Farm Fuel) located at S63W19501 College Avenue

NEW BUSINESS

Recommend Approval of Award of Bid for Library Family Restroom Remodel
[Finance_Common Council Memo Library Restroom.doc](#)
[Muskego - Bid RecommendationR.pdf](#)
[Muskego Bathroom - Bid Documents 2023-05-25R.pdf](#)

VOUCHER APPROVAL

Utility Vouchers - \$172,705.60
General Fund Vouchers - \$529,319.20
Wire Transfers for Payroll/Invoice Transmittals - \$525,043.98

FINANCE DIRECTOR'S REPORT

COMMUNICATIONS AND ANY OTHER BUSINESS AS AUTHORIZED BY LAW

ADJOURNMENT

NOTICE

IT IS POSSIBLE THAT MEMBERS OF AND POSSIBLY A QUORUM OF MEMBERS OF OTHER GOVERNMENTAL BODIES OF THE MUNICIPALITY MAY BE IN ATTENDANCE AT THE ABOVE-STATED MEETING TO GATHER INFORMATION; NO ACTION WILL BE TAKEN BY ANY GOVERNMENTAL BODY AT THE ABOVE-STATED MEETING OTHER THAN THE GOVERNMENTAL BODY SPECIFICALLY REFERRED TO ABOVE IN THIS NOTICE.

ALSO, UPON REASONABLE NOTICE, EFFORTS WILL BE MADE TO ACCOMMODATE THE NEEDS OF DISABLED INDIVIDUALS THROUGH APPROPRIATE AIDS AND SERVICES. FOR ADDITIONAL INFORMATION OR TO REQUEST THIS SERVICE, CONTACT MUSKEGO CITY HALL, (262) 679-4100.

CALL TO ORDER

Mayor Petfalski called the meeting to order at 5:55 pm.

PLEDGE OF ALLEGIANCE

Those present recited the Pledge of Allegiance.

ROLL CALL

Present: Alderpersons Wolfe, Schroeder, and Madden.

Also present: Alderpersons Terrence, Hammel & Kubacki, Public Works and Development Director Kroeger, City Attorney Warchol, City Clerk Roller and Assistant Deputy-Clerk Treasurer Kunke.

PUBLIC MEETING NOTICE

City Clerk Roller stated the meeting was noticed in accordance with the open meeting law.

APPROVAL OF MINUTES

Finance Committee Meeting - June 13, 2023

Alderson Schroeder moved to approve. Alderson Wolfe seconded; motion carried.

LICENSE APPROVALS

Recommend Approval of a Class "B" Dance Hall Permit to Rebecca S. Rodriguez, Individual (dba Pack N Brew Bar & Grill / P&B Station) located at S78W16355 Woods Rd.

Alderson Wolfe moved to approve. Alderson Schroeder seconded; motion carried.

NEW BUSINESS

Recommend Approval of Baseler Developer's Agreement

Alderson Madden moved to approve. Alderson Schroeder seconded; motion carried.

VOUCHER APPROVAL

Alderson Madden moved to recommend approval of Utility Vouchers in the amount of \$112,093.55. Alderson Schroeder seconded; motion carried.

Alderson Madden moved to recommend approval of General Fund Vouchers in the amount of \$120,444.05. Alderson Schroeder seconded; motion carried.

Alderson Madden moved to recommend approval of Wire Transfers for Payroll/Invoice Transmittals in the amount of \$410,442.96. Alderson Wolfe seconded; motion carried.

FINANCE DIRECTOR'S REPORT

Quarterly Report

No action taken.

COMMUNICATIONS AND ANY OTHER BUSINESS AS AUTHORIZED BY LAW

None/No action taken.

ADJOURNMENT

Alderson Schroeder moved to adjourn at 5:59 pm. Alderson Wolfe seconded; motion carried.

CITY OF MUSKEGO
Staff Report to Finance Committee/Common Council

To: Finance Committee/Common Council

From: Brittany Larson, MLIS – Library Director

Subject: Approval of Award of Bid for Library Family Restroom Remodel

Date: 7/11/2023

The City of Muskego Library is seeking approval to award the bid for the Library Family Restroom Remodel and enter into contract with:

William Sackerson Construction Company, Inc (\$35,600, \$5,000 contingency)

This project was publicly bid. The Family Restroom Remodel is part of the Council approved 2023 Capital Budget. William Sackerson Construction Company, Inc was the lone bidder and the bid is within budget.

Recommendation for Action by Committee:

The Library Board has approved the bid award at the June 20, 2023 meeting. We are asking for approval of a resolution from the Finance Committee/Common Council to enter into the contract with William Sackerson Construction Company, Inc.



13 June 2023

Muskego Public Library Board of Trustees
Muskego Public Library
S73 W16663 W Janesville Road
Muskego, WI 53150

RE: Recommendation for Award of Construction Contract

Board of Trustees,

Bids were received and opened on Friday, June 9, 2023 for the Muskego Public Library Family Bathroom Remodel. We reviewed the one bid received, which indicated that the lowest responsive and responsible bidder for the project is William Sackerson Construction Company, Inc, of 4749 S Whitnall Ave, Cudahy, WI 53110. We have contacted them, and they expressed their willingness and desire to proceed with the project.

The architect's estimate for the cost of the work was \$43,041. The bid received is below the estimate. The bid amount for William Sackerson Construction Company, Inc. was \$35,600. We recommend award of the contract to them. We also recommend budgeting, and making available, an additional \$5,000 for construction contingency due to the unknown conditions many times encountered in completing work in an existing building.

As stated in the bid documents, the project shall achieve Substantial Completion no later than June 1, 2024.

We are looking forward to assisting the Muskego Public Library with this project!

Respectfully,

Christy Monk, AIA
Principal

Attachments: Completed Bid Form and Bid Bond

BID FORM

1.1 BIDS DUE

- A. Date: **Friday, June 9, 2023**
- B. Time: **3:00 p.m.** local time.
- C. Location: City Hall W182 S8200 Racine Avenue Muskego, Wisconsin 53150

1.2 OWNER

- A. City of Muskego, Muskego, Wisconsin.

1.3 ARCHITECT

- A. **FEH DESIGN**, 1241 Corporate Center Drive, Oconomowoc, WI 53018.
- B. Architect's File No. 2022329.01

1.4 BIDDER INFORMATION

- A. Name: W Sackerson Const. Co, LLC.
- B. Address: 4749 S Whitwell Ave, Cadogan, WI
- C. Phone: 414-769-0888
- D. Facsimile: _____
- E. Date: 6/09/23

1.5 BID ACKNOWLEDGEMENTS

- A. The Bidder, in compliance with Notice to Bidders for the **Muskego Public Library Family Bathroom Remodel**, having examined the drawings and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, equipment and supplies and to construct the Project in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below.

- B. Bidder acknowledges receipt of the following Addenda covering revisions to the drawings and specifications, and the cost, if any, of such revisions has been included in the prices quoted:

Addendum No _____, Date: _____; Addendum No. _____, Date: _____;
Addendum No _____, Date: _____; Addendum No. _____, Date: _____;

1.6 BASE BID

- A. Bidder agrees to perform all of the Contract Work, including but not limited to electrical, fire protection, and telecommunications described in the Specifications and shown on the Drawings for the sum of:

thirty five thousand, six hundred & 00/100
Dollars (\$ 35,600)

1.7 PRICE GUARANTEE

- A. The undersigned agrees that the price stated in this Bid is guaranteed for ninety (90) consecutive calendar days, Sundays and holidays included from the Bid due date. If accepted by the City of Muskego within that period, the undersigned is to execute a formal contract with the City of Muskego, for the performance of the Contract at the stated price and is not subject to escalation.
- B. Accompanying this Bid is a certified check, cashier's check, or Bid Bond as Bid Security, as required by the Bidding Documents.

1.8 ACCEPTANCE OR REJECTION

- A. The City of Muskego reserves the right to reject any or all bids, re-advertise for new bids, and to waive informalities that may be in the best interest of the City of Muskego.

1.9 TAXES

- A. The undersigned certifies that all of the prices stated above do not include **Wisconsin** State Sales and Use Tax.

1.10 INSURANCE

- A. The undersigned agrees to provide Liability Insurance, Workmen's Compensation Insurance, Employer's Liability, as required by applicable Federal, State, and Local Laws, and in the amounts specified. Certificates shall be filed with the Owner prior to commencement of the Work.

1.11 AGREEMENT AND PERFORMANCE, MAINTENANCE, LABOR AND MATERIAL PAYMENT BONDS

- A. Upon receipt of Notice of Award of Contract, the Bidder agrees to execute the Agreement and to furnish executed Performance, Maintenance, Labor and Material Payment Bonds within seven (7) calendar days after receipt of said Notice of Award.

1.12 TIME OF COMPLETION

- A. Substantial Completion is required for this project.
 - 1. All work required by the Contract Documents shall achieve Substantial Completion by **June 1, 2024**.
- B. In lieu of date indicated above, Bidder proposes that all work required by the Contract Documents shall be Substantially Completed by the date indicated below.
 - 1. Bidder Proposed Substantial Completion Date: _____

1.13 LEGAL ADDRESS AND LEGAL STATUS OF BIDDER

A. Address: 4749 S. Whitetail Ave
Codomo, WI 53110-1003

B. Legal Classification: The undersigned does hereby declare that the Bidder has the legal status checked below:

- 1. _____ Individual
- 2. _____ Co-Partnership
- 3. Corporation incorporated under the Laws of the State of Wisconsin

C. This Bid is submitted in the name of:

W. Sackerson Const. Co., Inc.
 Company
[Signature]
 Signature
Vice President
 Title

D. Signed and sealed this 9 day of June, 2023.

END OF BID FORM



Bid Bond

CONTRACTOR:
(Name, legal status and address)
 William Sackerson Construction Co., Inc.
 4749 South Whitnall Avenue
 Cudahy, WI 53110

SURETY:
(Name, legal status and principal place of business)
 The Ohio Casualty Insurance Company
 175 Berkeley Street
 Boston, MA 02116

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

OWNER:
(Name, legal status and address)
 City of Muskego
 W182S8200 Racine Ave
 Muskego, WI 53150

MAILING ADDRESS FOR NOTICES:
 Liberty Mutual Surety Claims
 P.O. Box 34526
 Seattle, WA 98124

Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

BOND AMOUNT: 10% of Bid Amount Ten Percent of Bid Amount

PROJECT:
(Name, location or address, and Project number, if any)
 Muskego Public Library Family Bathroom Remodel

The Contractor and Surety are bound to the Owner in the amount set forth above, for the payment of which the Contractor and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, as provided herein. The conditions of this Bond are such that if the Owner accepts the bid of the Contractor within the time specified in the bid documents, or within such time period as may be agreed to by the Owner and Contractor, and the Contractor either (1) enters into a contract with the Owner in accordance with the terms of such bid, and gives such bond or bonds as may be specified in the bidding or Contract Documents, with a surety admitted in the jurisdiction of the Project and otherwise acceptable to the Owner, for the faithful performance of such Contract and for the prompt payment of labor and material furnished in the prosecution thereof; or (2) pays to the Owner the difference, not to exceed the amount of this Bond, between the amount specified in said bid and such larger amount for which the Owner may in good faith contract with another party to perform the work covered by said bid, then this obligation shall be null and void, otherwise to remain in full force and effect. The Surety hereby waives any notice of an agreement between the Owner and Contractor to extend the time in which the Owner may accept the bid. Waiver of notice by the Surety shall not apply to any extension exceeding sixty (60) days in the aggregate beyond the time for acceptance of bids specified in the bid documents, and the Owner and Contractor shall obtain the Surety's consent for an extension beyond sixty (60) days.

If this Bond is issued in connection with a subcontractor's bid to a Contractor, the term Contractor in this Bond shall be deemed to be Subcontractor and the term Owner shall be deemed to be Contractor.

When this Bond has been furnished to comply with a statutory or other legal requirement in the location of the Project, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. When so furnished, the intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

Signed and sealed this 9th day of June, 2023.

 (Witness)

 William Sackerson Construction Co., Inc.
 (Contractor as Principal) (Seal)

 (Witness)

Vice President

 (Title)
 The Ohio Casualty Insurance Company

 (Surety)

 (Title) Jack E. Bucholtz - Attorney in Fact

BID-0019023

Init.

Liberty Mutual Surety vouches that the original text of this document conforms exactly to the text in AIA Document A310-2010 Edition Bid Bond.



This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

The Ohio Casualty Insurance Company
POWER OF ATTORNEY

Principal: William Sackerson Construction Co., Inc.

Agency Name: Goetsch-Bucholtz, Inc.

Bond Number: BID-0019023

Obligee: City of Muskego

Bid Bond Amount: (10% of Bid Amount) Ten Percent of Bid Amount

KNOW ALL PERSONS BY THESE PRESENTS: that The Ohio Casualty Insurance Company, a corporation duly organized under the laws of the State of New Hampshire (herein collectively called the "Company"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint Jack E. Bucholtz in the city and state of West Allis, WI, each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Company in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Company and the corporate seal of the Company has been affixed thereto this 26th day of September, 2016.



The Ohio Casualty Insurance Company

By: *David M. Carey*

David M. Carey, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

STATE OF PENNSYLVANIA ss
COUNTY OF MONTGOMERY

On this 26th day of September, 2016, before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of The Ohio Casualty Insurance Company and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.



Commonwealth of Pennsylvania - Notary Seal
Teresa Pastella, Notary Public
Montgomery County
My commission expires March 28, 2025
Commission number 1126044
Member, Pennsylvania Association of Notaries

By: *Teresa Pastella*

Teresa Pastella, Notary Public

For bond and/or Power of Attorney (POA) verification inquiries, please call 610-832-8240 or email HOSUR@libertymutual.com.

This Power of Attorney is made and executed pursuant to and by authority of the following By-law and Authorizations of The Ohio Casualty Insurance Company, which is now in full force and effect reading as follows:

ARTICLE IV – OFFICERS: Section 12. Power of Attorney.

Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

Certificate of Designation – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

Authorization – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature or electronic signatures of any assistant secretary of the Company or facsimile or mechanically reproduced or electronic seal of the Company, wherever appearing upon a certified copy of any power of attorney or bond issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Renee C. Llewellyn, the undersigned, Assistant Secretary, of The Ohio Casualty Insurance Company do hereby certify that this power of attorney executed by said Company is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Company this 9th day of June, 2023.



By: *Renee C. Llewellyn*

Renee C. Llewellyn, Assistant Secretary

PROJECT MANUAL AND DRAWINGS

Construction Documents

MUSKEGO PUBLIC LIBRARY FAMILY BATHROOM REMODEL

S73 W16663 W Janesville Road
Muskego, WI 53150

FEH Project No. 2022329.01

25 May 2023



FEH DESIGN
ARCHITECTURE / ENGINEERING / INTERIORS

SIOUX CITY, IA
712 252 3889

DES MOINES, IA
515 288 2000

DUBUQUE, IA
563 583 4900

OCONOMOWOC, WI
262 968 2055

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**INVITATION TO BID
MUSKEGO PUBLIC LIBRARY
LIBRARY FAMILY BATHROOM REMODEL**

The City of Muskego is issuing this Invitation to Bid for general construction (interior), minor mechanical, plumbing, and electrical work at the Muskego Public Library S73 W16663 W Janesville Road Muskego, WI. This will be a single prime contractor lump sum bid.

Bids shall be prepared in accordance with the contract documents prepared by **FEH DESIGN**, 1241 Corporate Center Drive, Oconomowoc, WI 53018.

Time and Place for Receiving Bids: The City of Muskego will accept sealed bids from qualified firms as follows:

Bids Due: No later than 3:00 p.m. CST, **Friday, June 9, 2023**
At: City Clerk
City of Muskego
W182 S8200 Racine Avenue
Muskego, Wisconsin 53150
Bid Opening: Bids will be opened publicly at the above-stated location, date, and time.
Basis of Bid: Single Prime Contractor Lump Sum

Bids received after 3:00 p.m. will not be accepted. Actual receipt by said time is required and deposit in the mail is insufficient. The envelope containing the sealed bid shall bear the name and address of the interested firm and the notation "**Muskego Public Library Family Bathroom Remodel**" on the outside of the envelope.

Instructions: Electronic Bidding Documents, including Drawings and Specifications, may be viewed and downloaded from the Muskego Public Library website. All contractors are responsible for the viewing/ downloading of the correct documents for the purpose of providing a sufficient bid. As holders of these documents, the viewer acknowledges the requirements to obtain any addenda or other materials prior to bidding and/or construction of the project. Since neither the owner nor **FEH DESIGN** has control over the means of printing these documents, the viewer is responsible for verifying that all documents are obtained and that they have printed correctly.

Bidder is responsible for errors or missing information if documents are obtained from sources other than the library's website. Owner will not allow or excuse incorrect bids submitted by a Contractor based on errors or missing information in documents obtained from sources other than the Library's website.

Drawings and specifications will be available on May 25, 2023.

In general, the work is defined by the Contract Documents and consists of the following:

- Renovation of the existing family bathroom including finishes.
- Minor plumbing fixture relocation, mechanical balancing, and electrical modifications.

The work under the Contract shall be commenced on or before a date to be specified in the Contract or written Notice to Proceed of the Owner, and shall achieve **Substantial Completion no later than June 1, 2024**.

Document Availability: Bidding Documents will be on file after 25 May 2023 at the Architect's Office, 1241 Corporate Center Drive, Oconomowoc, WI 53018; Muskego Public Library S73 W16663 W Janesville Road Muskego, WI 53150; and at the following Plan Centers:

Dodge Reports/ McGraw Hill Construction, Bid + Network, Madison, Milwaukee

Site Visits: If interested in walking through the existing building, contact Brittany Larson at the Muskego Public Library using blarson@muskego.wi.gov

Bid Rejection: The City of Muskego reserves the right to reject in whole or in part any and all bids, to waive any informalities, and to accept the bids determined to be in the best interest of the City. This invitation may be canceled if determined to be in the best interest of the City. Bids shall remain in effect for a period of 90 days.

Bid Security: Bids shall be accompanied by a security deposit in the form of a Bid Bond or certified check in the amount of no less than 10 percent of the Bid Sum. Endorse the Bid Bond or certified check in the name of the City of Muskego as obligee, signed and sealed by the Contractor as principal, and the Surety. After a Bid has been accepted, securities will be returned to all other Bidders. The accepted bidder's security deposit will be returned after delivery to the Owner of the required Performance and Labor and Materials Payment Bond. Include the cost of the Bid security in the Bid Sum. If no contract is awarded, all security deposits will be returned. If the successful bidder fails to execute the contract and furnish payment and performance bonds within 15 days after the award, the Check or Bid Bond shall be forfeited to City of Muskego as liquidated damages per Wisconsin Statutes.

Performance and Payment Bonds: Performance and Payment Bonds are required.

State Sales Tax: This project is tax Exempt (per 2015 Wisconsin Act 126).

City of Muskego, Wisconsin
Brittany Larson MLIS
Muskego Public Library Director

MUSKEGO PUBLIC LIBRARY FAMILY BATHROOM REMODEL INSTRUCTIONS TO BIDDERS

1. **Purpose:** The purpose of this request is to provide the City of Muskego with Bid for general construction (interior), minor mechanical, plumbing, and electrical work at the Muskego Public Library S73 W16663 W Janesville Road Muskego, WI.
2. **Contract Period:** The work under the Contract shall be commenced on or before a date to be specified in the Contract or written Notice to Proceed of the Owner, and shall achieve Substantial Completion no later than June 1, 2024.
3. **Bid Submittal:**
Bids shall be enclosed in a sealed opaque envelope with envelope clearly marked and addressed as follows:

Bid for: City of Muskego
 Muskego Public Library Family Bathroom Remodel

Address to: City Clerk
 City of Muskego
 W182 S8200 Racine Avenue
 Muskego, Wisconsin 53150

The bidding firm's name shall appear in the upper left-hand corner of envelope.

Sealed bids for the work will be accepted until 3:00 PM CST on **June 9, 2023** by the City of Muskego. All bids received after 3:00 PM CST on **June 9, 2023** will be returned unopened to the Bidder. Bids will be opened shortly after 3:00 PM.

The Owner is a tax-exempt entity. Sales and use tax should not be included in the bid.

This project is tax exempt, and the City of Muskego will provide the necessary tax exempt materials. The Owner reserves the right to reject any or all bids and to waive technicalities therein.

The winning bids shall be subject to owner's approval.

4. **Bid Form:**
All bids must be submitted on the Bid Forms provided herein. All blank spaces for bid prices shall be filled in, in ink or typed. Bids submitted shall remain in force for a period of ninety (90) days from date receipt of the Bids.

Bids shall not contain any qualifications or recapitulations of the work.

Oral or telephonic bids, or modifications will not be permitted. Bids must be signed in ink. Any erasures or corrections on form must be initialed by signee. Prices must be expressed in words and figures with the written price, in case of a discrepancy, constituting the bid amount. Any discrepancies between the bid amount and extension shall be resolved in favor of the unit price.

Each Bidder shall indicate receipt of any Addendum issued.

Each Bidder shall state its Federal Tax Identification Number on the appropriate line provided in bid form.

5. **Bid Documents:**

Bidding Documents will be on file after 25 May 2023 at the Architect's Office, 1241 Corporate Center Drive, Oconomowoc, WI 53018; Muskego Public Library S73 W16663 W Janesville Road Muskego, WI 53150; and at the following Plan Centers:
Dodge Reports/ McGraw Hill Construction, Bid + Network, Madison, Milwaukee

Questions relating to Bid Documents should be addressed to:

Christy Monk
FEH DESIGN
951 Main Street
Dubuque, IA 52001
christym@fehdesign.com
Phone: 563.583.4900

6. **Alternates:** Materials, products, and equipment described in the Bid Documents establish a standard of required quality, function, and appearance to be met by any proposed alternate. Requests for alternates should be submitted to **FEH DESIGN** no later than seven (7) calendar days prior to the bid date. Alternate requests received after that date will not be considered. Alternate requests will be reviewed and answered by addendum no later than two (2) calendar days prior to the bid date. Acceptance of alternates is the decision of the Owner and Architect. Complete product literature must be submitted to the Architect for any alternates proposed.
7. **Addendum:** Changes, revisions or additions to the Bid Documents will be issued by addendum and posted to the library's website. Items included in addendums should be addressed and included in the bid submitted by bidders. Addendum items will become a part of the Contract. No oral, telephonic or telegraphic bids or modifications of the bids will be entertained.
8. **Interpretation of Bid Documents:** No interpretation of meaning will be made except by Addendum issued by Architect. Bidder shall promptly notify the Architect of any ambiguity, inconsistency, error or omission, which they may discover upon examination of the bid documents. Or should Bidder be in doubt as to their meaning, Bidder shall immediately notify the Architect in writing. All addenda so issued shall become part of the Bid and Contract Documents.

In the case of errors, inconsistencies, or ambiguities in the Bidding documents not interpreted or clarified by addendum or discovered too late for an addendum, the following applies:

- 1) The better quality or greater quantity of Work shall be provided.
 - 2) To the best of their ability, the Bidders shall determine the proper methods or materials to fulfill the design intent of the Bidding Documents and include the cost of providing such methods in the Bid.
 - 3) Failure to request clarification will not waive the responsibility of comprehension of the documents and performance of the Work in accordance with the intent of the documents. Signing the Agreement will be considered as thorough comprehension of intent of the Bidding Documents.
9. **Bid Security:** Bids shall be accompanied by a security deposit in the form of a Bid Bond or certified check in the amount of no less than 10 percent of the Bid Sum. Endorse the Bid Bond or certified check in the name of the City of Muskego as obligee, signed and sealed by the Contractor as principal, and the Surety. After a Bid has been accepted, securities will be returned to all other Bidders. The accepted bidder's security deposit will be returned after delivery to the Owner of the required Performance and Labor and Materials Payment Bond. Include the cost of the Bid security in the Bid Sum. If no contract is awarded, all security deposits will be returned. If the successful bidder fails to execute the contract and furnish

payment and performance bonds within 15 days after the award, the Check or Bid Bond shall be forfeited to City of Muskego as liquidated damages per Wisconsin Statutes.

10. **Performance and Payment Bonds:** Performance and Payment Bonds are required. The Contractor shall furnish bonds covering faithful performance of the Contract and payment of obligations arising there under. Bonds may be obtained through the Contractor's usual source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to 100 percent of the Contract Sum.
11. **State Sales Tax:** This project is tax Exempt (per 2015 Wisconsin Act 126).
12. **Errors in Bid:** Bidders or their authorized agents are expected to examine all Contract Documents, Drawings, Specifications, circulars, schedules, addenda and other instructions pertaining to the Work. Failure to do so will be at the Bidder's own risk and he cannot secure relief on the plea of error in the Bid.
13. **Disqualification of Bidder:** Any one or more of the following causes may be considered as sufficient for the disqualification of a Bidder and the rejection of his Bid:
 - 1) More than one bid for the same work from an individual, firm, partnership, or corporation under the same or different names.
 - 2) Evidence of collusion among Bidders. (Participants in such collusion may receive no recognition as Bidders for any future work.)
 - 3) Lack of responsibility as evidenced by poor workmanship and progress of past work.
 - 4) Incomplete work that in the judgment of the City might hinder or prevent the prompt completion of additional work if awarded.
 - 5) For being in arrears on existing contracts, in litigation with the City, or having defaulted on a previous contract.
14. **Withdrawal of Bids:** A bid cannot be withdrawn after it is filed, unless the Bidder makes his request in writing to the Owner prior to the time set for opening of bids, or unless the Owner fails to accept Bidder's bid within ninety (90) days after the date of opening the bids.
15. **Method of Award:** The City of Muskego will select the Bid that it deems most reasonable and in its best interest in terms of cost, quality, appearance, performance of the Contractor and the Contractor's proximity to the site and his ability to service the Project after it has been completed.

The Contract will be awarded based on the above qualifications to the lowest responsible Bidder for the lowest combination of Base Bid and selected Alternates.

The City of Muskego reserves the right to reject any or all bids, re-advertise for new bids, and to waive informalities that may be in the best interest of the Library Board, Muskego Public Library, and the City of Muskego.

No contract is binding upon the City of Muskego until it has been executed by and approved by the Library Board and the City of Muskego, and delivered to the Contractor and the Contract Bond has been filed and approved.

16. **Contract:** If awarded this request, the Bidder's shall provide a contract for construction to the Owner for review by the legal department prior to signing.

Orders, Invoices, and Payments:

Invoices shall be submitted to:

Brittany Larson, Muskego Public Library
S73 W16663 W Janesville Road
Muskego, Wisconsin 53150
blarson@muskego.wi.gov

Payments shall be processed upon receipt of the correct invoice after receipt and acceptance of each progress amount based on work completed. The Contractor shall provide insurance coverage for portions of the Work stored off the site after written approval of the Owner at the value established in the approval, and also for portions of the Work in transit.

Progress payments shall be made monthly by invoice. Monthly estimates will be paid to the Contractor as the work progresses in the amounts equal to ninety-five percent (95%) of the Contract Value of the work completed, including materials and equipment delivered and properly stored at the Project site, during the preceding calendar month, and will be based upon an Invoice prepared by the Contractor and subject to the approval of the Owner. The Contractor shall submit the Application for Payment to the Owner not later than the first day of the following month. City of Muskego shall make payment to the Contractor by the last day of the month. Such monthly payments shall in no way be construed as an act of acceptance for any part of the work, partially or totally completed. The remaining balance of five percent (5%) of the Contract Sum, shall be paid by City of Muskego to the Contractor no earlier than thirty (30) days after the date of final acceptance of said Work by the Owner, subject to the conditions and in accordance with the provisions of the Code of Wisconsin. No such partial of final payment will be due until the Contractor has certified to the City of Muskego that the materials, labor and services involved in each estimate have been paid for in accordance with the requirements stated in the Specifications. Final payment will be issued 30 days after final acceptance of the project by the City Council.

17. Insurance and Indemnification Requirements:

INSURANCE AND INDEMNIFICATION

In order to protect against potential liability arising out of the activities performed hereunder, contractor shall obtain and maintain, in full force and effect, comprehensive general liability insurance with minimum limits of \$1,000,000 per occurrence and \$1,000,000 aggregate. Said insurance may not be cancelled, reduced or changed in any way without at least thirty (30) day written notice to the City. Failure to provide proper notice, in and of itself, shall be grounds for termination of this agreement. Contractor shall obtain Certificates of Insurance as well as Endorsements to its insurance policies as follows:

1. 30-day notice of cancellation.
2. Contractor's primary insurance.
3. Waiver of rights of recovery against others to us.
4. Naming the City, the Architect (FEH Design) and the Engineer (Henneman Engineering) as additional insured.

Contractor hereby agrees to indemnify, defend and hold harmless the City of Muskego, its elected and appointed officials, officers, employees, agents, representatives and volunteers, and each of them, from and against any and all suits, actions, legal or administrative proceedings, claims, demands, damages, liabilities, interest, attorney's fees, costs, and expenses of whatsoever kind or nature in any manner directly or indirectly caused, occasioned, or contributed to in whole or in part or claimed to be caused,

occasioned, or contributed to in whole or in part, by reason of any act, omission, fault, or negligence, whether active or passive, of Contractor or of anyone acting under its direction or control or on its behalf, even if liability is also sought to be imposed on City of Muskego, its elected and appointed officials, officers, employees, agents, representatives and volunteers. The obligation to indemnify, defend and hold harmless the City of Muskego, its elected and appointed officials, officers, employees, agents, representatives and volunteers, and each of them, shall be applicable unless liability results from the sole negligence of the City of Muskego, its elected and appointed officials, officers, employees, agents, representatives and volunteers.

Contractor shall reimburse the City of Muskego, its elected and appointed officials, officers, employees, agent or authorized representatives or volunteers for any and all legal expenses and costs incurred by each of them in connection therewith or in enforcing the indemnity herein provided.

In the event that Contractor employs other persons, firms, corporations or entities (sub-contractor) as part of the work covered by this Agreement, it shall be The Sole responsibility to require and confirm that each sub-contractor enters into an Indemnity Agreement in favor of the City of Muskego, its elected and appointed officials, officers, employees, agents, representatives and volunteers, which is identical to this Indemnity Agreement.

This indemnity provision shall survive the termination or expiration of this Agreement.

18. Changes in Work:

All changes in Material or Methods as described in the Plans and Specifications must have written approval by the Owner and Architect prior to incorporation in the Project.

All changes in the Plans and Specifications must be documented by a Change Order Form outlined in the owner-contractor agreement.

Total adjustments in Contract Amount are to reflect a reasonable markup to reflect overhead and profit, not to exceed as follows:

- 1) Change executed by Subcontractor: 10% by Subcontractor for overhead and profit and 5% by General Contractor for coordination and profit. The maximum markup by General Contractor & Subcontractor shall not exceed 15% of base labor and material charges.
- 2) Change executed by General Contractor without subcontractor involvement: 10% for overhead and profit.
- 3) General Contractor and Sub-contractors shall provide written detailed documentation for each (sub) contractor showing their time and materials on all changes submitted for review by the Architect unless pre-approved at a fixed amount.

19. Bid Results: Results of bid opening will be available seven (7) calendar days after bid date. All formal and informal notifications of bid awards will be done by the interior designer.

20. Schedule: The work under the Contract shall be commenced on or before a date to be specified in the Contract or written Notice to Proceed of the Owner, and shall achieve Substantial Completion no later than **June 1, 2024. The building will remain occupied during construction.** The contractor shall provide a construction schedule to the owner for dates and duration of anticipated work.

21. **Submittals:** Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. Shop Drawings shall be submitted in electronic format only.
22. **Final Cleaning:** Upon completion of the project, conduct a final cleaning of all modified spaces; comply with manufacturer's written instructions/recommendations. Extra materials of value to become the owner's property and shall be stored as directed by the owner.
23. **Operational and Maintenance Data:** Provide all maintenance manuals for equipment and products to the Owner, if any. Prior to final inspection, instruct the Owner or designated personnel in operation, adjustment, and maintenance of equipment. Provide instruction at mutually agreed upon times.
24. **Warranties:** Upon installation of all material and equipment, the contractor shall provide to the Owner manufacturer(s) standard and special warranties on all furniture included in proposal.

END OF SECTION 00 21 43

BID FORM

1.1 BIDS DUE

- A. Date: **Friday, June 9, 2023**
- B. Time: **3:00 p.m.** local time.
- C. Location: City Hall W182 S8200 Racine Avenue Muskego, Wisconsin 53150

1.2 OWNER

- A. City of Muskego, Muskego, Wisconsin.

1.3 ARCHITECT

- A. **FEH DESIGN**, 1241 Corporate Center Drive, Oconomowoc, WI 53018.
- B. Architect's File No. 2022329.01

1.4 BIDDER INFORMATION

- A. Name: _____
- B. Address: _____
- C. Phone: _____
- D. Facsimile: _____
- E. Date: _____

1.5 BID ACKNOWLEDGEMENTS

- A. The Bidder, in compliance with Notice to Bidders for the **Muskego Public Library Family Bathroom Remodel**, having examined the drawings and specifications with related documents and the site of the proposed work, and being familiar with all of the conditions surrounding the construction of the proposed Project, including the availability of materials and labor, hereby proposes to furnish all labor, materials, equipment and supplies and to construct the Project in accordance with the Contract Documents, within the time set forth therein, and at the prices stated below.

- B. Bidder acknowledges receipt of the following Addenda covering revisions to the drawings and specifications, and the cost, if any, of such revisions has been included in the prices quoted:

Addendum No _____, Date: _____; Addendum No. _____, Date: _____;

Addendum No _____, Date: _____; Addendum No. _____, Date: _____;

1.6 BASE BID

- A. Bidder agrees to perform all of the Contract Work, including but not limited to electrical, fire protection, and telecommunications described in the Specifications and shown on the Drawings for the sum of:

_____ Dollars (\$_____)

1.7 PRICE GUARANTEE

- A. The undersigned agrees that the price stated in this Bid is guaranteed for ninety (90) consecutive calendar days, Sundays and holidays included from the Bid due date. If accepted by the City of Muskego within that period, the undersigned is to execute a formal contract with the City of Muskego, for the performance of the Contract at the stated price and is not subject to escalation.
- B. Accompanying this Bid is a certified check, cashier's check, or Bid Bond as Bid Security, as required by the Bidding Documents.

1.8 ACCEPTANCE OR REJECTION

- A. The City of Muskego reserves the right to reject any or all bids, re-advertise for new bids, and to waive informalities that may be in the best interest of the City of Muskego.

1.9 TAXES

- A. The undersigned certifies that all of the prices stated above do not include **Wisconsin** State Sales and Use Tax.

1.10 INSURANCE

- A. The undersigned agrees to provide Liability Insurance, Workmen's Compensation Insurance, Employer's Liability, as required by applicable Federal, State, and Local Laws, and in the amounts specified. Certificates shall be filed with the Owner prior to commencement of the Work.

1.11 AGREEMENT AND PERFORMANCE, MAINTENANCE, LABOR AND MATERIAL PAYMENT BONDS

- A. Upon receipt of Notice of Award of Contract, the Bidder agrees to execute the Agreement and to furnish executed Performance, Maintenance, Labor and Material Payment Bonds within seven (7) calendar days after receipt of said Notice of Award.

1.12 TIME OF COMPLETION

- A. Substantial Completion is required for this project.
 - 1. All work required by the Contract Documents shall achieve Substantial Completion by **June 1, 2024.**
- B. In lieu of date indicated above, Bidder proposes that all work required by the Contract Documents shall be Substantially Completed by the date indicated below.
 - 1. Bidder Proposed Substantial Completion Date: _____

1.13 LEGAL ADDRESS AND LEGAL STATUS OF BIDDER

- A. Address: _____

- B. Legal Classification: The undersigned does hereby declare that the Bidder has the legal status checked below:
 - 1. _____ Individual
 - 2. _____ Co-Partnership
 - 3. _____ Corporation incorporated under the Laws of the State of Wisconsin
- C. This Bid is submitted in the name of:

Company

Signature

Title
- D. Signed and sealed this _____ day of _____, 201____.

END OF BID FORM

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SECTION 01 1000 - SUMMARY

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. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Work by Owner.
 - 4. Owner-furnished products.
 - 5. Existing and Salvaged Items for Reuse
 - 6. Access to site.
 - 7. Work restrictions.
 - 8. Specification and drawing conventions.
 - 9. Miscellaneous provisions.
- B. Related Requirements:
 - 1. Section 01 5000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Muskego Public Library Family Bathroom Remodel.
 - 1. Project Location: Muskego Public Library S73 W16663 W Janesville Road Muskego, WI 53150
- B. Owner: City of Muskego, Muskego, WI.
 - 1. Owner's Representative: Brittany Larson, MLIS Library Director Muskego Public Library p. 262-971-2119
- C. Architect: Design.
 - 1. 1241 Corporate Center Drive, Oconomowoc, WI 53018. Contact: Project Architect – Christy Monk,
- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
 - 1. Electrical, Mechanical, Plumbing Engineering: Henneman Engineering
 - a. 20855 Watertown Road, Suite 170, Waukesha, Wisconsin 53186. Contact Mitchell Setterman. T: (262) 901-0626

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. Renovation of the existing family bathroom including finishes.
 - 2. Minor plumbing fixture relocation, mechanical balancing, and electrical modifications.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.
- C. Building Permit
 - 1. Contactor shall obtain all permits to complete the Work required by the overseeing municipality. These fees shall be included in the bid amount.

1.5 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Concurrent Work: Owner will not perform any construction operations at Project site.

1.6 OWNER-FURNISHED PRODUCTS

- A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.
- B. Owner-Furnished Products (as noted on the drawings):
 - 1. Adjustable-Height Adult Changing Station

1.7 EXISTING AND SALVAGED ITEMS FOR REUSE

- A. There are a number of existing items that will be installed by the contractor. The Work includes handling, cleaning, protecting, and installing salvaged products and coordinating with the installation of new Work.
 - 1. Refer to section 02 4119 – Selective Demolition, for process and procedures.
- B. Existing items to be salvaged for reuse:
 - 1. Toilet Accessories (toilet paper dispenser, napkin disposer, robe hook, baby changing station, grab bars, etc.). See drawings for additional information.
 - 2. Ceiling tiles and grid
 - 3. Existing MEP equipment and fixtures disrupted during work
 - 4. Plumbing Fixtures

1.8 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to areas within the family bathroom. Do not disturb portions of Project site beyond areas in which the Work is indicated.
- C. Areas for staging of materials and equipment are limited. Coordinate with owner on space available.

1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work to normal business working hours of 8am-8pm Monday-Thursday, 8am-5pm Friday, unless otherwise indicated or coordinated with the owner.
 - 1. Weekend Hours: Limit work to hours of 9 a.m. to 5 p.m. on Saturday, unless otherwise indicated or coordinated with the owner.
 - 2. Hours for Utility Shutdowns: Preferred hours for shutting down building utilities is between 7 am and 9 am, when the library is not open to the public.
- C. Existing Utility Interruptions: Do not interrupt utilities serving adjacent facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 - 2. Coordinate a time for noisy work outside of normal library hours of operation.
 - 3. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 50 feet of entrances, operable windows, or outdoor-air intakes.
- F. Controlled Substances: Use of tobacco products and other controlled substances within the existing building and on Project site is **NOT PERMITTED**.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

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. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. Requests for Information (RFIs).
- B. Related Requirements:
 - 1. Section 01 3200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 01 7300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 01 7700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontractor List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
 - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within **15 days** of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities, and activities of other contractors, to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Preinstallation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
 1. Coordination Plan: provide coordination drawings showing required installation of new work prior to and subsequent to new activities.

2. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple sub-contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
 - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.

- c. Panel board, switch board, switchgear, transformer, buss way, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes dimensioned from column center lines.
8. Fire-Protection System: Show the following:
- a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads
9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents and if not possible to request interpretation at the next Project Meeting, the **Contractor is to call the Architect** to review and determine if an RFI is required. If so determined by the Contractor and Architect, the Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project numbers.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Proposal Request according to Section 00 21 34 "Instructions to Bidders."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 7 days of receipt of the RFI response.
- D. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at each Project Meeting and review any new RFI's and / or any recently answered RFI's that need discussion.
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100

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SECTION 01 4000 - QUALITY CONTROL REQUIREMENTS

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. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. **Contractor is responsible for all testing and monitoring on the project** unless specifically noted to be provided by Owner in subsequent specification Sections.
- C. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 REQUIREMENTS INCLUDED

- A. General Quality Control
- B. Workmanship
- C. Manufacturer's Instructions
- D. Manufacturer's Certificates
- E. Mockups
- F. Manufacturer's Field Services
- G. Testing Laboratory Services
- H. Testing Agency Qualifications and Quality Assurance

- I. Inspections
- J. Retest Responsibility
- K. Contractor's Responsibilities
- L. Payment for Tests
- M. Special Structural Testing and Inspection

1.4 RELATED REQUIREMENTS

- A. Document 007200 - General Conditions: Inspecting and testing required by governing authorities.
- B. Section 01 3300 - Submittals: Submittal of Manufacturer's Instructions and Certificates.
- C. Quality Assurance and Quality Control paragraphs of each Technical Specifications Section.

1.5 DEFINITIONS

- A. OC = Owner's Consultant
- B. OITL = Owner's Independent Testing Laboratory
- C. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- D. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.6 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.7 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 1. Specification Section number and title.
 2. Entity responsible for performing tests and inspections.
 3. Description of test and inspection.
 4. Identification of applicable standards.
 5. Identification of test and inspection methods.
 6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, and telephone number of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Recommendations on retesting and re-inspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. **Installer Qualifications:** A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. **Professional Engineer Qualifications:** A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. **Specialists:** Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. **Manufacturer's Technical Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

1.10 QUALITY CONTROL

- A. Maintain quality control over suppliers, manufacturer's products, services, site conditions, and workmanship, to produce Work of specified quality. Quality control is the Contractor's primary responsibility.
- B. **Owner Responsibilities:** Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

1.11 CONTRACTOR RESPONSIBILITIES:

- A. The Contractor shall schedule and coordinate all Pre-Construction, Pre-Installation, and Construction Testing and Inspection Operations. The Contractor shall provide a minimum of five (5) working days' notice to the OITL, and the appropriate firms and/or agencies before starting Work requiring inspection or testing. The Contractor shall provide a minimum of three (3) working days' notice thereafter for each testing or inspection for the continuation of that item with reasonable date and time fixed for such inspections and tests. If the Work is covered up prior to any required testing or observation, it shall be uncovered for review at the Contractor's expense.
- B. Contractors shall cooperate with the OC and OITL personnel, and shall provide all scaffolding, staging or temporary heat necessary for OITL to access the Work, and the manufacturer's operations.

- C. Contractors shall provide to the OITL without cost, samples of proposed materials which require testing and pay shipping costs of such samples to the OITL's or other testing agencies' facility.
- D. Contractors shall provide the preliminary design mix(es) proposed to be used for concrete and other materials to the OITL which require verification for compliance or testing by the OITL.
- E. Contractors shall furnish copies of test reports as required.
- F. Contractors shall furnish incidental labor and facilities necessary:
- G. To provide access to the Work to be tested,
- H. To obtain and handle samples at the Project site or at the source of the product to be tested,
- I. To facilitate inspections and tests. The Contractor shall notify the Architect, OC and OITL a minimum of three (3) working days prior to expected times for operations requiring the OC's or OITL's services.
- J. The Contractor shall notify the Architect, OC and OITL a minimum of three (3) working days prior to expected times for operations requiring the OC's or OITL's services.
- K. Contractors shall make arrangements with the OITL and pay for additional samples and tests taken for Contractor's convenience.
- L. Inspection and testing shall in no way relieve the Contractor or supplier from responsibility for furnishing materials and workmanship in accordance with the Contract Documents.
- M. Contractors shall comply with other instructions from the Architect regarding testing.

1.12 PAYMENT FOR TESTS AND INSPECTIONS

- A. In general, the Contractor shall pay for Pre-Construction laboratory tests, field tests, and inspections conducted to determine the quality of materials and workmanship at the site.
- B. The Owner will not pay for testing of mechanical and electrical systems, unless specified otherwise.
- C. The Contractor shall pay for all retesting, re-inspection and re-observation costs.

1.13 TESTS AND INSPECTIONS, GENERAL

- A. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

1.14 WORKMANSHIP

- A. Comply with industry standards unless more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- B. Perform Work by persons qualified to produce workmanship of specified quality.
- C. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, and racking.

1.15 MANUFACTURER'S INSTRUCTIONS

- A. Comply with Manufacturer's Instructions in full detail, including each step in sequence. Should Manufacturer's Instructions conflict with Contract Documents, request clarification from Architect before proceeding.

1.16 MANUFACTURER'S CERTIFICATES

- A. When required by individual Specifications Section, submit Manufacturer's Certificate and/or Test Reports confirming that products meet or exceed specified requirements.

1.17 MOCKUPS

- A. When required by individual Specifications Section, erect complete, full-scale mockup of assembly at Project site. Remove mockup when directed by Architect or as indicated in individual Sections.

1.18 MANUFACTURER'S FIELD SERVICES:

- A. Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 3300 "Submittal Procedures."
- B. Manufacturer's Representative shall submit written reports to the Architect, Owner and Contractor listing observations and recommendations.

1.19 MANUFACTURER'S TECHNICAL SERVICES:

- A. Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation

conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

1.20 RETEST RESPONSIBILITIES

- A. Where results of required inspections, tests, or similar prove unsatisfactory and do not indicate compliance of related Work with requirements of the Contract Documents, then retests are the responsibility of the Contractor, regardless of whether the original test was the Contractor's responsibility. Retesting of Work revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original Work.
- B. When any testing or observations indicate the Work is non-compliant with the Contract Documents, all retesting and re-observations shall be performed by the Owner's testing or observation agencies. All costs for retesting and re-observations, including additional services of the design professionals, the design professional's consultants and the Owner's consultants are the Contractor's responsibility and shall be deducted from the Contract Sum by Change Order.

1.21 TESTING LABORATORY SERVICES

- A. The Owner will select and pay for and the Contractor shall schedule the services of the Owner's Consultant (OC) and the Owners Independent Testing Laboratories, (OITL) to perform inspections, tests, and other services required by various Specification Sections.
- B. The Owner will employ and pay for a Special Inspector, if required by code authorities having jurisdiction, to provide structural system inspections during construction as may be required by applicable codes. The Contractor shall coordinate operations with the Special Inspector and cooperate with the Special Inspector in the required inspections.
- C. When initial tests find noncompliance with the Contract Documents, all retesting will be performed by the OILT and all retesting costs shall be deducted from the Contract Sum by Change Order.
- D. The Contractor shall employ and pay for services of laboratories to perform all other inspections, tests, and services required by individual Specification Sections. Services shall be performed in accordance with requirements of governing authorities and with specified standards.
- E. The design mixes to be prepared and the design mix tests required for the Project before construction begins shall be arranged and paid for separately by the Contractor.
- F. All tests specified and/or required by code, permit, or regulatory requirements shall be arranged and paid for separately by the Contractor, unless noted otherwise.
- G. The Contractor shall include the costs of all Contractor testing requirements in their bid price.
- H. Reports on tests from both the OITL and the Contractor's laboratories will be sent to the Contractor, the Architect, the Structural Engineer, the Owner's Representative and the Owner giving observations and results of tests, indicating compliance or noncompliance with specified standards and with Contract Documents.

1.22 TESTING AGENCY QUALIFICATIONS

- A. "Approved Independent Testing Laboratory" shall mean an independent testing agency acceptable to the Owner and the Architect and possessing the professional qualifications, equipment and personnel to perform the specified tests and to evaluate and report the results.

1.23 TESTING AGENCY QUALITY ASSURANCE

- A. Laboratory shall comply with requirements of ASTM D3740 and ASTM E329.
- B. Laboratory shall maintain a full-time registered Engineer on staff to review services.
- C. Laboratory shall be authorized to operate in the State in which the Project is located.
- D. Testing equipment shall be calibrated at reasonable intervals with devices of an accuracy traceable to either NBS Standards or accepted values of natural physical constants.
- E. No rejected materials shall be incorporated into the Work. All rejected materials shall be immediately identified by the Laboratory, marked and removed from the site at no expense to the Owner.
- F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.

- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and - control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

- 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.24 REFERENCES

- A. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- B. ASTM E329 - Standard Recommended Practice for Inspecting and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

1.25 INSPECTIONS

- A. When the Specifications, Architect's instruction, laws, ordinances or any public authority requires any Work to be inspected or approved, the Contractor shall provide a minimum of five (5) working days' notice to the appropriate firms and/or agencies before starting Work requiring inspection or testing. The Contractor shall provide a minimum of three (3) working days' notice thereafter for each testing or inspection for the continuation of that item with a reasonable date and time fixed for such inspections and tests. If the Work is covered up prior to any required testing or observation, it shall be uncovered for review at the Contractor's expense.
- B. Inspection and testing services are required to verify certain aspects of the Work for compliances with requirements specified or indicated for the Owner. These services do not relieve the Contractor of responsibility for compliances with Contract Document requirements.
- C. Inspection and testing agencies are not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.

1.26 CODE-REQUIRED SPECIAL INSPECTIONS AND PROCEDURES AND REPORTS

- A. The OITL agency and other inspection consultants shall submit reports and shall conduct and interpret tests and inspections and state in each report whether to the best of their knowledge; (1) test specimens and observations comply with Contract Documents, and specifically state any deviations, (2) record types and locations of defects found in Work, (3) record Work required and performed, to correct deficiencies.
- B. Reports for tests and inspections shall be submitted in a timely manner to the Contractor, Building Official (if required), the Architect, the Structural Engineer, the Owner's Representative and the Owner.

- 1. Submit Reports for ongoing Work, to provide the information noted below:

- a. Date issued.
 - b. Project title
 - c. Firm name and address
 - d. Name and signature of tester or inspector
 - e. Date and time of sampling
 - f. Date of test or inspection
 - g. Identification of Specification Section and products

- h. Location in Project, including elevations, grid location and detail
 - i. Type of test or inspection
 - j. Results of tests or inspections and interpretations of same
 - k. Observations regarding compliance with Contract Documents or deviations therefrom
- 2. Submit two (2) original copies of a final, signed Report to the Owner stating that, to the best of the inspector's knowledge, the Work requiring testing and/or inspection conformed to the Construction Documents.
- C. The OITL agency and/or inspectors shall submit reports including similar information as described in subparagraph A. above for conventional testing and inspection requirements as described in the Specifications in a timely manner to the Contractor, the Architect, the Structural Engineer, the Owner's Inspection Consultant(s), the Owner's Representative and the Owner, all as directed by the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

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SECTION 01 4200 - REFERENCES

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 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
10. AF&PA - American Forest & Paper Association; www.afandpa.org.
11. AGA - American Gas Association; www.aga.org.
12. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
14. AI - Asphalt Institute; www.asphaltinstitute.org.
15. AIA - American Institute of Architects (The); www.aia.org.
16. AISC - American Institute of Steel Construction; www.aisc.org.
17. AISI - American Iron and Steel Institute; www.steel.org.
18. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
19. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
20. ANSI - American National Standards Institute; www.ansi.org.
21. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
22. APA - APA - The Engineered Wood Association; www.apawood.org.
23. APA - Architectural Precast Association; www.archprecast.org.
24. API - American Petroleum Institute; www.api.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
27. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
33. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
34. ASTM - ASTM International; (American Society for Testing and Materials International); www.astm.org.
35. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
36. AWEA - American Wind Energy Association; www.awea.org.

37. AWI - Architectural Woodwork Institute; www.awinet.org.
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
39. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); www.awpa.com.
40. AWS - American Welding Society; www.aws.org.
41. AWWA - American Water Works Association; www.awwa.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; www.ec-central.org.
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; www.eima.com.
75. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; www.evo-world.org.
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
81. FM Approvals - FM Approvals LLC; www.fmglobal.com.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarroof.com.
84. FSA - Fluid Sealing Association; www.fluidsealing.com.

85. FSC - Forest Stewardship Council U.S.; www.fscus.org.
86. GA - Gypsum Association; www.gypsum.org.
87. GANA - Glass Association of North America; www.glasswebsite.com.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
93. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
94. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
95. IAS - International Approval Services; (See CSA).
96. ICBO - International Conference of Building Officials; (See ICC).
97. ICC - International Code Council; www.iccsafe.org.
98. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
99. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
100. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
101. IEC - International Electrotechnical Commission; www.iec.ch.
102. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
103. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
104. IESNA - Illuminating Engineering Society of North America; (See IES).
105. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
106. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
107. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
108. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
109. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
110. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
111. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
112. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
113. ISO - International Organization for Standardization; www.iso.org.
114. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
115. ITU - International Telecommunication Union; www.itu.int/home.
116. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
117. LMA - Laminating Materials Association; (See CPA).
118. LPI - Lightning Protection Institute; www.lightning.org.
119. MBMA - Metal Building Manufacturers Association; www.mbma.com.
120. MCA - Metal Construction Association; www.metalconstruction.org.
121. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
122. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
123. MHIA - Material Handling Industry of America; www.mhia.org.
124. MIA - Marble Institute of America; www.marble-institute.com.
125. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
126. MPI - Master Painters Institute; www.paintinfo.com.
127. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
128. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
129. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
130. NADCA - National Air Duct Cleaners Association; www.nadca.com.
131. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
132. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
133. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.

134. NCMA - National Concrete Masonry Association; www.ncma.org.
135. NEBB - National Environmental Balancing Bureau; www.nebb.org.
136. NECA - National Electrical Contractors Association; www.necanet.org.
137. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
138. NEMA - National Electrical Manufacturers Association; www.nema.org.
139. NETA - InterNational Electrical Testing Association; www.netaworld.org.
140. NFHS - National Federation of State High School Associations; www.nfhs.org.
141. NFPA - NFPA; (National Fire Protection Association); www.nfpa.org.
142. NFPA - NFPA International; (See NFPA).
143. NFRC - National Fenestration Rating Council; www.nfrc.org.
144. NHLA - National Hardwood Lumber Association; www.nhla.com.
145. NLGA - National Lumber Grades Authority; www.nlga.org.
146. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
147. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
148. NRCA - National Roofing Contractors Association; www.nrca.net.
149. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
150. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
151. NSPE - National Society of Professional Engineers; www.nspe.org.
152. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
153. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
154. NWFA - National Wood Flooring Association; www.nwfa.org.
155. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
156. PDI - Plumbing & Drainage Institute; www.pdionline.org.
157. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
158. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
159. RFCI - Resilient Floor Covering Institute; www.rfci.com.
160. RIS - Redwood Inspection Service; www.redwoodinspection.com.
161. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
162. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
163. SDI - Steel Deck Institute; www.sdi.org.
164. SDI - Steel Door Institute; www.steeldoor.org.
165. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
167. SIA - Security Industry Association; www.siaonline.org.
168. SJI - Steel Joist Institute; www.steeljoist.org.
169. SMA - Screen Manufacturers Association; www.smainfo.org.
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
171. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
172. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
173. SPIB - Southern Pine Inspection Bureau; www.spib.org.
174. SPRI - Single Ply Roofing Industry; www.spri.org.
175. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
176. SSINA - Specialty Steel Industry of North America; www.ssina.com.
177. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
178. STI - Steel Tank Institute; www.steeltank.com.
179. SWI - Steel Window Institute; www.steelwindows.com.
180. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
181. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
182. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); www.tileusa.com.
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.

184. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
185. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS - The Masonry Society; www.masonrysociety.org.
187. TPI - Truss Plate Institute; www.tpinst.org.
188. TPI - Turfgrass Producers International; www.turfgrassod.org.
189. TRI - Tile Roofing Institute; www.tilerroofing.org.
190. UBC - Uniform Building Code; (See ICC).
191. UL - Underwriters Laboratories Inc.; www.ul.com.
192. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
193. USAV - USA Volleyball; www.usavolleyball.org.
194. USGBC - U.S. Green Building Council; www.usgbc.org.
195. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
196. WASTEC - Waste Equipment Technology Association; www.wastec.org.
197. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
198. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
199. WDMA - Window & Door Manufacturers Association; www.wdma.com.
200. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.
201. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
202. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
203. WPA - Western Wood Products Association; www.wwpa.org.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up-to-date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; <http://dodssp.daps.dla.mil>.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; <http://eetd.lbl.gov>.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; www.trb.org.

15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeia; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 4200

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SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

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. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 01 1000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Water Service: The Contractor is responsible for all appurtenances and costs associated with supplying water during construction operations. **Connection to the existing utilities is allowed. Payment for use will be requested by the library based on the increase in costs.**
- C. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations. **Connection to the existing building power is allowed. Payment for use will be requested by the library based on the increase in costs**

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Show temporary facilities, staging areas, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Dust- Control Plan: Submit coordination drawing and narrative that indicates the dust-control measures proposed for use, proposed locations, and proposed time frame for their operation.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - 1. Locations of dust-control partitions at each phase of work.
 - 2. HVAC system isolation schematic drawing.
 - 3. Location of proposed air-filtration system discharge.
 - 4. Waste handling procedures.
 - 5. Other dust-control measures.
- C. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

- A. **The library will be occupying the space during construction.** Extensive coordination will be required throughout the project to ensure the safety of the public and staff utilizing the library during construction.
- B. Access and use of the multi-stall restrooms on either side of the family restroom must be maintained at all times except during working hours before 9am, before the Library opens.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Provide solid surface barricade materials for protection of the public during the construction activities.

2.2 TEMPORARY FACILITIES

- A. Storage and Fabrication enclosures: Provide enclosures sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.
- B. Toilet Units: **The existing bathrooms will be available for contractor use. Do not use sinks for cleaning construction equipment nor the garbage cans for construction materials.**

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

PART 3 - EXECUTION

3.1 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 01 1000 "Summary."
- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Site Enclosure Fence: Provide a construction limits fence system, with gates.
 - 1. Provide own padlocks for gates. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Temporary Egress: Maintain temporary egress from property as required by authorities having jurisdiction.
- G. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather-tight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.2 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.

- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard, replace, or clean stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

3.3 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

- D. Termination and Removal: Remove each temporary facility when need for its service has ended, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

END OF SECTION 01 5000

SECTION 01 6000 - PRODUCT REQUIREMENTS

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. 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 Sections:
 - 1. Division 01 Section "References" for applicable industry standards for products specified.

1.3 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.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product prior to bidding. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. 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 Division 01 Section "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 Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 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.

1.6 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. Protect stored products from damage and liquids from freezing.
 4. Provide a secure location and enclosure at Project site for storage of materials and equipment. Coordinate location with Owner.

1.7 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 Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.
- C. **Submittal Time:** Comply with requirements in Division 01 Section "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.
 6. **Or Equal:** For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- 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 may be considered at Architect's discretion, prior to bid.
 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 may be considered at Architect's discretion, prior to bid.
 3. **Products:**

- a. Non-restricted 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 prior to bid.
4. Manufacturers:
 - a. Non-restricted 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 prior to bid.
 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.
 - 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 01 6000

SECTION 01 7300 - EXECUTION

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. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 01 1000 "Summary" for limits on use of Project site.
 - 2. Section 01 7700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

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 construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 3. Dates: Indicate when cutting and patching will be performed.
 - 4. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated

and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements that are to remain, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching 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 provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning site work, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
 - 2. In the event there are unforeseen utilities discovered, contact the Owners' Project Manager.
- B. Existing Utilities: the existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

- C. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
- D. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- E. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 3100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Site Improvements: Locate and lay out site improvements, including grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- C. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, 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. Temporary Support: Provide temporary support of work to be cut.
- C. 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.

- 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 minimize interruption to occupied areas.
- E. 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.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum 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. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Proceed with patching after demolition operations requiring cutting are complete.
- F. 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 practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
- G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 degrees F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
- B. Site: Maintain Project site free of waste materials and debris.

- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- F. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."
- G. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- H. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- I. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

END OF SECTION 01 7300

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 02 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. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or results in increased maintenance or decreased operational life or safety.
 - a. Primary operational systems and equipment.
 - b. Mechanical systems piping and ducts.
 - c. Control systems.
 - d. Communication systems.
 - e. Electrical wiring systems.
 - f. Operating systems of special construction.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or results in increased maintenance or decreased operational life or safety.

- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Equipment supports.
 - d. Piping, ductwork, vessels, and equipment
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.5 WARRANTY

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

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 minimize 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. 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.
- 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

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SECTION 01 7700 - CLOSEOUT PROCEDURES

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. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Preliminary Inspection Procedure.
 - 3. Final completion procedures.
 - 4. Warranties.
 - 5. Final cleaning.
 - 6. Substantial Completion of the Contract, Pre-Closeout and Inspection Procedure.
 - 7. Final Inspection Procedure.
 - 8. Final Completion and Final Payment Conditions.
- B. Related Sections:
 - 1. Division 01 Section "Execution" for progress cleaning of Project site.
 - 2. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION OF THE CONTRACT, PRE-CLOSEOUT AND INSPECTION PROCEDURE

- A. When the Work, or a designated portion thereof, is approaching Substantial Completion, the Contractor shall submit a written request stating that they have inspected the Work and that it is ready for an inspection for Substantial Completion by the Architect, together with a list of items to be completed or corrected. If the Architect considers the Work to be sufficiently complete, the Architect will establish a date for an inspection for Substantial Completion.
- B. The Architect, accompanied by the Owner and Contractor, will conduct the inspection for Substantial Completion. If the Architect determines that the Work is then substantially complete, the Architect will prepare a Certificate of Substantial Completion, as provided in the General Conditions of the Contract, and a list (punch list for Substantial Completion) of work items remaining to be completed or corrected by the Contractor.
- C. As a condition of and prior to the date of Substantial Completion of the Contract, the Contractor shall submit to the Architect for approval and delivery to the Owner, the following:
 - 1. Evidence of compliance with requirements of governing authorities, including copies of Certificates of Inspection.

- D. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

1.4 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting final observation for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
5. Prepare and submit final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
6. Terminate and remove temporary facilities from Project site, along with construction tools, and similar elements.
7. Advise Owner of changeover in utilities, if applicable.
8. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
9. Complete final cleaning requirements.
10. Touch up and otherwise repair and restore marred site conditions to eliminate visual defects.

- B. Observation: Submit a written request for Review for Substantial Completion. Contractor shall complete the **Closeout form** at the end of this section, to request a Review for Substantial completion.

1. Complete and submit one form for each request for review. For each Phase of the Work, provide a completed form requesting the review for Substantial Completion.

- C. On receipt of request, Architect will either proceed with the review or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after the review or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-Observation: Request a follow up review when the Work identified in previous observations as "incomplete", are completed or corrected.
2. Results of completed reviews will form the basis of requirements for final completion.
3. Architect will provide for one Initial Review for Substantial Completion for each identified Phase of the Work, and one Final Review for each Phase. If additional reviews are required because of work not complete or correct by the General Contractor or their Sub-Contractors, the General Contractor will be responsible for paying for the Architect's time to perform subsequent re-observations and reviews.

1.5 FINAL COMPLETION OF THE CONTRACT AND INSPECTION PROCEDURE

- A. Preliminary Procedures: Before requesting final review for determining final completion, complete the following:

1. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- B. Observation: Submit a written request for final review for acceptance. On receipt of request, Architect will either proceed with review or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after observation or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Re-Observation: Request review when the Work identified in previous observations as "incomplete", are completed or corrected.
- C. As a condition of and prior to Project Final Completion of the Contract, the Contractor shall prepare and submit to the Architect for approval and delivery to the Owner, original signed copies of each of the following:
1. A completed and signed Project Closeout Checklist, indicating all items have been completed.

1.6 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, starting with exterior areas first.
 2. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 3. Submit list of incomplete items in the following format:
 - a. PDF electronic file.
- B. When the items on the punch list(s) for Substantial Completion have been fully completed or corrected, the Contractor shall return the punch list to the Architect indicating in writing that the Work is complete, that each punch list item conforms to the Contract Documents and the Contractor shall request a final inspection. The Architect will establish a date for the Final Inspection.
- C. The Architect, accompanied by the Owner and Contractor, will conduct the Final Inspection. If the Architect determines that the Work is then acceptable under the Contract Documents and the Contract fully performed, the Architect will so notify the Owner and the Contractor in writing. If the Architect determines that the Work is not fully performed, the Contractor shall complete all remaining items of Work before the Work will be considered for Final Acceptance.

1.7 FINAL PAYMENT CONDITIONS

- A. Final Completion or the Date of Final Acceptance for the purposes of these Specifications shall mean the date on which the Architect and Owner accept the site in writing. Final Completion shall not be construed to mean acceptance of any Work subsequently found to be inferior, substandard, missing or not in accord with the Contract Documents. Such Work shall be remedied as directed by the Architect, the same as though the Work had not been approved.

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.

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 portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by demolition and 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. 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.
 - f. Remove debris and surface dust from limited access spaces, including roofs, equipment vaults, manholes, and similar spaces.
 - g. Leave Project clean and ready for occupancy.

END OF SECTION 01 7700

SECTION 017710 - CLOSEOUT FORM

1.1 CERTIFICATE OF COMPLETION REQUEST

- A. This Certificate is to be signed by the Contractor and transmitted to the Architect as the request for review of Substantial completion. The intent of this certificate is to expedite closeout of the project and to help assure the Owner that the portion of the work described below is complete, complies with all regulatory requirements and can be occupied for its intended purpose.

1.2 I _____ hereby certify the following:

(Insert Contractor Name / Company)

- A. I have reviewed the Contract Documents including all modifications.
- B. I have inspected the Work.
- C. The Work is completed in accordance with the Contract Documents and all approved contract modifications.
- D. An Occupancy Permit has been issued for this part of the project.
- E. A separate 8 ½ x 11 exhibit may be attached which clearly describes the area in consideration for review. Exhibits may include representative floor plans or site plans.
- F. The portion of the Work ready for review for Substantial Completion is identified as follows

The Entire Project

The following portions of the project:

The undersigned has acknowledged that the following portions of Work are not complete or ready for review. These portions will be reviewed under a separate request by the Contractor.

- 1.3 Contractor understands and agrees that if the architect and/or the engineers determine that the work is insufficiently complete to perform the observations, the owner may assess the contractor for the cost of the additional time and expense incurred by the architect, engineers and the owner for additional site visits, observations and expenses. These costs will be deducted from the contract amount through the change order process.

(Contractor Name / Company Name)

(Signature)

(Date)

END OF SECTION 017710

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

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 administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Operation manuals for systems, subsystems, and equipment.
 - 3. Maintenance manuals for the care and maintenance of products, materials, and finishes systems and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Division 01 Section "Closeout Procedures" for submitting operation and maint. manuals.
 - 3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
 - 4. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 SUBMITTALS

- A. Initial Submittal: Submit 1 draft copy of each manual electronically at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.
- B. Final Submittal: Submit 1 hard copy and an electronic copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
 - 1. Correct or modify each manual to comply with Architect's comments. Submit 1 hard copy and an electronic copy of each corrected manual within 15 days of receipt of Architect's comments.

1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 MANUALS, GENERAL

- A. 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.
- B. Title Page: Enclose title page in transparent plastic sleeve. 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, address, and telephone number of Contractor.
 - 6. Name and address of Architect.
 - 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. 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.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. 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.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. 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. 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 diskettes for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 5. 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.

2.3 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.
 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.
 - 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 MANUAL

- 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.
 1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- 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 printed 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 videotape, 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.
 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- 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.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- 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.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- 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.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- 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.
 - 2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."
- F. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 7823

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

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 administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Sections include the following:
 - 1. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal: Submit one set(s) of corrected Record Transparencies and one set(s) of marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return plots and prints for organizing into sets, printing, binding, and final submittal.
 - b. Final Submittal: Submit one set(s) of marked-up Record Prints. Print each Drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit 2 copies of Project's Specifications, including addenda and contract modifications and upload to project website.
- C. Record Product Data: Submit 1 copies of each Product Data submittal and upload to project website.
 - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an understandable drawing technique.
 - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for

formatting, organizing, copying, binding, and submitting.

- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
 - 1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
 - 5. Note related Change Orders and Record Drawings where applicable.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 - 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 01 7839

SECTION 01 7900 - DEMONSTRATION AND TRAINING

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 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.
- B. Related Sections include the following:
 - 1. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 SUBMITTALS

- A. Instruction Program: Submit 1 hard copy and an electronic copy of outline of instructional program for demonstration and training, including 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. At completion of training, submit 1 hard copy and an electronic copy of complete training manual(s) for Owner's use.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
 - 1. Equipment, including food-service equipment.
 - 2. Fire-protection systems, including fire alarm fire pumps and fire-extinguishing systems.
 - 3. Heat generation, including pumps and water distribution piping.
 - 4. Refrigeration systems, including pumps and distribution piping.
 - 5. HVAC systems, including air-handling equipment air distribution systems and terminal equipment and devices.
 - 6. HVAC instrumentation and controls.
 - 7. Electrical service and distribution, including transformers, switchboards, panel boards, uninterruptible power supplies and motor controls.
 - 8. Lighting equipment and controls.
- 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:
 - 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 combined training manual.
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. 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.
- C. 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.
- D. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01 7900

SECTION 02 4119-SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building items.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
 - 1. Section 01 1000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
 - 2. Section 01 7300 "Execution" for cutting and patching procedures.

1.3 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.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property for dust control, and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 3. Coordination for shutoff, capping, and continuation of utility services.
 4. Use of elevator and stairs.
 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- D. Predemolition Photographs or Video: Submit before Work begins.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.7 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.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials are NOT anticipated to be present in buildings and structures to be selectively demolished.
- 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

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. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. 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.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. 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 01 1000 "Summary."
- B. 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. Arrange to shut off indicated utilities with utility companies.
 - 2. 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.
 - 3. 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. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

3.3 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.
 - 1. Comply with requirements for access and protection specified in Section 01 5000 "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 3. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 4. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 5000 "Temporary Facilities and Controls."
- 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.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 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. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. 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.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. 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 fire watch and portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.
 - 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

9. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 7419 "Construction Waste Management and Disposal."
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
- C. Removed and Salvaged Items:
 1. Transport items to Owner's storage area designated by Owner.
- D. 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.
- E. 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 cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 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.
 4. Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 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 02 4119

SECTION 06 1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 1. Wood blocking and nailers.
 2. Framing with dimension lumber.
 3. Plywood backing panels.

ALL ROUGH CARPENTRY FOR THE PROJECT SHALL BE FIRE RATED UNLESS NOTED OTHERWISE.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 4. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWWA C31 with inorganic boron (SBX).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, stripping, and similar concealed members in contact with masonry or concrete.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat items indicated on Drawings.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
 2. Nailers.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M. Use stainless steel fasteners if required based on pressure-preservative chemicals used.

- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.6 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- C. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- D. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.

2. Use copper naphthenate for items not continuously protected from liquid water.
- E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 1. NES NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
- F. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 1000

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SECTION 07 9200-JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Mildew-resistant joint sealants.
 - 4. Latex joint sealants.
- B. Related Requirements:
 - 1. Division 09 Section "Gypsum Board"

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

- C. Preconstruction Field-Adhesion-Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each kind of sealant and joint substrate.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Final Acceptance.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: 20 years from date of Final Acceptance for weatherseal and non-staining of silicone sealants.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:
 1. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 756 SMS.
 - b. GE Advanced Materials - Silicones; SilPruf NB SCS9000.

- c. Sika Corporation, Construction Products Division; SikaSil-C995.
- d. Tremco Incorporated; Spectrem 3.
- e. Pecora 864 NST
- f. Or approved equal.

2.3 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 786 Mildew Resistant.
 - b. GE Advanced Materials - Silicones; Sanitary SCS1700.
 - c. Tremco Incorporated; Tremsil 200 Sanitary.
 - d. Or approved equal.

2.4 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 500 feet of joint length for each kind of sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.

- b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
- 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
 - 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 9200

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SECTION 08 8300-MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:
 - 1. Film-backed glass mirrors qualifying as safety glazing.
- B. Related Requirements:
 - 1. Section 08 8000 "Glazing" for glass with reflective coatings used for vision lites.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For mirrors to include in maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.

- B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
- B. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.

2.2 SILVERED FLAT GLASS MIRRORS

- A. Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
- B. Safety Glazing Products: For film-backed mirrors, provide products that comply with 16 CFR 1201, Category II.
- C. Refer to drawings for locations and sizes.

2.3 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- C. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.4 MIRROR HARDWARE

- A. Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.
 - 1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.
 - 2. Finish: Satin anodized.
- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield, expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.5 FABRICATION

- A. Fabricate mirrors in the shop to greatest extent possible.
- B. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Flat polished.
 - 1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.
- D. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint, as recommended in writing by film-backing manufacturer, to produce a surface free of bubbles, blisters, and other imperfections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.


3.3 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
 - 1. GANA Publications: "Glazing Manual" and "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- B. Provide a minimum airspace of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Install mirrors with mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
 - 1. Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
 - 2. Install mastic as follows:
 - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
 - c. After mastic is applied, align mirrors and press into place while maintaining a minimum airspace of 1/8 inch between back of mirrors and mounting surface.

3.4 CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08 8300

<u>Swatch</u>	<u>Tag</u>	<u>Manufacturer</u>	<u>Product Description</u>	<u>Location(s)</u>
DIVISION 9 – FINISHES				
09 30 00 Tiling				
<i>Note: Grout joints to be 1/8"</i>				
	CT-1	Atlas Concorde	Style: Reflex Color: Titanium Size: 11¾" x 23⅝" Finish: Matte Installation:	Floor tile in Restrooms
	CT-2	Atlas Concorde	Style: Reflex Color: Titanium Size: Cove Base, 6" x 12" Finish: Matte	Wall base in Restrooms
	GT-1	Custom Building Products	Color: #335 Winter Gray	Restroom floors
09 91 23 Interior Paint				
	P-1	Sherwin Williams	Color: SW 7101 Futon	Restroom walls

END OF SECTION 090000

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SECTION 09 2900-GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
- B. Related Requirements:
 - 1. Section 09 9123 "Interior Painting" for primers applied to gypsum board surfaces.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch-long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- C. STC-Rated Assemblies: For 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 by an independent testing agency.
 - 1. STC at interior partitions shall be a minimum of 44.

2.2 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum
 - b. CertainTeed Corp.
 - c. G-P Gypsum.
 - d. Lafarge North America Inc.
 - e. National Gypsum Company.
 - f. USG Corporation.
- B. Gypsum Wallboard:
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
 - 3. **Moisture-Resistant Board required in bathroom location.**

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 - 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint.
 - e. Curved-Edge Cornerbead: With notched or flexible flanges.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Wallboard: Paper.
 - 2. Exterior Gypsum Soffit Board: Paper.
 - 3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 4. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
 - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
 - 1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft.in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch-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.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Regular Type: On ceilings and vertical surfaces above 8'-0" adjacent floor level.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For 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.
- B. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners.
 2. LC-Bead: Use at exposed panel edges.
 3. L-Bead: Use where indicated.
 4. Curved-Edge Cornerbead: Use at curved openings.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
2. Level 2: Panels that are substrate for tile.
3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 09 9123 "Interior Painting."

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 2900

SECTION 09 3000-TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Porcelain tile.
 - 2. Crack isolation membrane.
 - 3. Tile backing panels.
 - 4. Grout
- B. Related Sections:
 - 1. Section 09 2900 "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Full-size units of each type of trim and accessory.
3. Metal edge strips in 6-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.6 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.
1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
1. Crack isolation membrane.
 2. Joint sealants.
 3. Cementitious backer units.
 4. Metal edge strips.
- D. Preinstallation Conference: Conduct conference at Project site.
1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Porcelain Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.2 TILE PRODUCTS

- A. Tile Types (CT-1 and CT-2):
 - 1. Basis-of-Design Products: As indicated in Section 09 0000 "Finish and Material Legend".
 - 2. Grout Color: As indicated in Section 09 0000 "Finish and Material Legend".

2.3 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. PVC Sheet Membrane: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester 0.040 inch nominal thickness.

1. Basis-of-Design Product: Subject to compliance with requirements provide, Noble Company, NobleSeal CIS or a comparable product by one of the following:
 - a. Laticrete International, Inc.; Laticrete Crack Isolation Mat.
 - b. Mapei Corporation, Mapesonic 2.
 - c. Or approved equal.

2.4 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide MAPEI Corporation; Ultraflex 2, or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. TEC; a subsidiary of H. B. Fuller Company.
 2. Provide prepackaged, dry-mortar mix combined with acrylic resin liquid-latex additive at Project site.
 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
 4. Performance Requirements:
 - a. Shear Strength per ANSI A118.4 tests (at 28 days).
 - 1) Ceramic mosaic: 325 psi
 5. **Apply thin set mortar to achieve positive slope to floor drains.**

2.5 GROUT MATERIALS (GT-1)

- A. Polymer-Modified Tile Grout: ANSI A118.7.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide MAPEI Corporation; Ultracolor, or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. TEC; a subsidiary of H. B. Fuller Company.
 - c. Or approved equal.
 2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, re-dispersible form, prepackaged with other dry ingredients.
 3. Performance Requirements:
 - a. Compressive Strength:
 - 1) At 3 hours, not less than 2,000 psi
 - 2) At 24 hours, not less than 3,000 psi
 - 3) At 72 hours, not less than 3,500 psi
 - 4) At 7 days, not less than 4,600 psi
 - 5) At 28 days, not less than 5,500 psi

2.6 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 07 9200 "Joint Sealants."
 - 1. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
 - 2. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. 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.
- D. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

2.7 MISCELLANEOUS MATERIALS

- A. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- B. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

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.
 2. Verify that concrete substrates for tile floors installed with thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - c. Verify that existing floors that have had previously installed carpet or tile removed, are sufficiently prepared to receive new tile installation.
 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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 toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 TILE 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 or larger.
 - c. Tile floors composed of rib-backed tiles.
- 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. 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.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 inch.
 - 2. Quarry Tile: 1/8 inch.
 - 3. Paver Tile: 1/8 inch.
- F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- G. Apply thin set mortar to achieve positive slope to floor drains. Provide sealant at floor drain perimeter.**
- 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 07 9200 "Joint Sealants."
- I. 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.
- J. Grout Sealer: Apply grout sealer to grout joints in tile floors 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.

3.4 CRACK ISOLATION MEMBRANE INSTALLATION

- A. 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.
- B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.5 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.6 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Installations, Concrete:
 - 1. Tile Installation W202: Thin-set mortar; TCA W202.
 - a. Tile Type: CT-1.
 - b. Thin-Set Mortar: Latex- portland cement mortar.
 - c. Grout (GT-1): 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: CT-2.
 - b. Thin-Set Mortar: Latex-portland cement mortar.
 - c. Grout (GT-1): Polymer-modified unsanded grout.

END OF SECTION 09 3000

SECTION 09 5113-ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6 inches in size.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Suspended ceiling components.
 - 2. Structural members to which suspension systems will be attached.
 - 3. Size and location of initial access modules for acoustical panels.
 - 4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - 5. Perimeter moldings.
- B. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Panels: Full-size panels equal to 5 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
 - 3. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 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.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.
- B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.

- C. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- D. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.
- E. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
- F. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide USG, Sheetrock Brand Lay-In Ceiling Panel ClimaPlus, Vinyl, or a comparable product by another manufacturer **TO MATCH THE EXISTING CEILING TILE TO REMAIN IN THE BATHROOM.**
- B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - 1. Type and Form: Type XX, other types; described as high-density, ceramic- and mineral-base panels with scrubbable finish, resistant to heat, moisture, and corrosive fumes.
 - 2. Pattern: Embossed vinyl laminated face
- C. Color: White.
- D. LR: Not less than **0.77**.
- E. CAC: Not less than **35**.
- F. Edge/Joint Detail: Square Lay-in
- G. Thickness: **1/2 inch**.
- H. Modular Size: **24 by 48 inches** Antimicrobial Treatment: Broad spectrum fungicide and bactericide based.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 - b. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
 - c. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 2. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 3. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.
- D. Hold-Down Clips: In **Entry 100**, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Donn **DX / DXL** as manufactured by USG Interiors LLC or a comparable product by one of the following:
1. Armstrong, Prelude XL, 15/16" Exposed Tee
- B. Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation; with prefinished 9/16-inch- (15-mm-) wide metal caps on flanges.
1. Structural Classification: **Heavy**-duty system.
 2. End Condition of Cross Runners: **Flush Fit** type.
 3. Face Design: Flat, flush.
 4. Cap Material: Steel cold-rolled sheet.
 5. Coordinate finish in subparagraph below with metal type selected.

6. Cap Finish: Painted white.
7. Corners: preformed.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products listed above.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel 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. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 6. Do not attach hangers to steel deck tabs.
 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Support for Recessed and Semi-recessed Grid-Type Fluorescent Fixtures: Units may be supported from suspended ceiling support system. Install ceiling support system rods or wires at a minimum of 4 rods or wires for each fixtures, located not more than 6 inches from fixture corners.
1. Install support clips for recessed fixtures, securely fastened to ceiling grid members, at or near each fixture corner.
 2. Fixtures of Sizes less than Ceiling Grid: **Located as indicated on Drawings.** Support fixtures independently with at least two ¾-inch metal channels spanning and secured to ceiling tees.
- E. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- F. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- G. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.

1. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
4. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 5113

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SECTION 09 9123-INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete masonry units (CMU).
 - 2. Underside of structural precast planks
 - 3. Galvanized metal.
 - 4. Gypsum board.
- B. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of **exposed to view** bare and covered pipes and ducts, hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
- C. Do not paint pre-finished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Pre-finished items include the following factory-finished components:
 - a. Acoustical ceiling tile.
 - b. Metal lockers.
 - c. Aluminum windows.
 - d. Finished mechanical and electrical equipment.
 - e. Light fixtures.
 - f. Brick veneer/ thin brick / cast stone
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.
 - d. Utility tunnels.
 - e. Pipe spaces.
 - f. Duct shafts.
 - 3. Finished metal surfaces include the following:

- a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper and copper alloys.
 - e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
- a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Related Requirements:
1. Section 05 1200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
 2. Section 09 9600 "High-Performance Coatings" for high-performance and special-use coatings.
 3. Section 09 9113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
 4. Section 09 9300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.
 5. Division 23 Section "Mechanical Assemblies" for surface preparation and finish coats for exposed ductwork, exposed HVAC equipment and exposed uninsulated piping.
 6. Division 26 Section "Electrical Assemblies" for surface preparation and finish coats for exposed conduit and other exposed prime painted electrical items

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily.

1.7 PROJECT CONDITIONS

- A. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- B. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

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:
 1. Benjamin Moore & Co.
 2. Diamond Vogel Paints.
 3. ICI Paints.
 4. PPG Architectural Finishes, Inc.
 5. Sherwin-Williams Company (The).
 6. Or approved equal.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. 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.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction [and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24)].
 1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Floor Coatings: 100 g/L.
 9. Shellacs, Clear: 730 g/L.
 10. Shellacs, Pigmented: 550 g/L.
- D. 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.

E. Colors: As indicated in specification section 09 0000 "Finish and Material Legend".

2.3 PRIMERS/SEALERS

- A. Primer Sealer, Latex, Interior:
1. Sherwin-Williams; ProMar 200, Interior Latex Primer.
 2. Or Equal.

2.4 WATER-BASED PAINTS

- A. Latex, Interior, (Gloss Level 3):
1. Sherwin-Williams; Pro Industrial Pre-Catalyzed Waterbased Epoxy.
 2. Or Equal.

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 the Work.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and 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.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
 - 2. **Remove existing wallpaper and prep for painted finish.**
- D. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.

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. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer over metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- C. 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.
- D. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- E. 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.
- F. At areas noted or scheduled as "Exposed Structure" to be painted or ceilings with no acoustical ceiling tile/grid noted or scheduled to be painted, the following shall apply:
1. Include painting of all new and exposed conduit, electrical equipment, data cable, cable trays, ductwork, piping, ect. to match the adjacent ceiling color.
- G. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.
- H. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.
- I. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed to view in equipment rooms and occupied spaces, including occupied spaces without acoustical ceilings.
- J. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and 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. Tanks that do not have factory-applied final finishes.
- e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
- f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material that are exposed to view in occupied spaces.
- g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

2. Electrical Work:

- a. Conduit and boxes that are exposed to view in occupied spaces.
 - b. Electrical equipment that is indicated to have a factory-primed finish for field painting.
- K. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- L. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- M. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, or other surface imperfections will not be acceptable

3.4 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.

3.5 INTERIOR PAINTING COLOR SCHEDULE

- A. Basis-of-Design Product: Sherwin-Williams Company (The), or a comparable product of one of the other listed manufacturers. Initial color selections as indicated in specification section 09 0000 "Finish and Material Legend".

END OF SECTION 09 9123

SECTION 10 2800-TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
- B. Related Sections:
 - 1. Section 08 8300 "Mirrors" for frameless mirrors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.6 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required

for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Bobrick Washroom Equipment, Inc.
 - 2. Bradley Corporation.
- A. Toilet Tissue (Roll) Dispenser:
 - 1. Existing to be reinstalled
- B. Recessed Waste Receptacle:
 - 1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc.; B-43644.
 - 2. Description: Recessed Waste Receptacle.
 - 3. Mounting: Recessed with projecting receptacle.
 - a. Designed for nominal 4-inch wall depth.
 - 4. Minimum Waste-Receptacle Capacity: 12.8 gal.
 - 5. Material and Finish: Stainless steel, No. 4 finish (satin).
 - 6. Liner: Liner-Mate waste-receptacle liner.
- C. Towel (Roll) Dispenser:
 - 1. Existing to be reinstalled.
- D. Liquid-Soap Dispenser:
 - 1. Basis-of-Design Product: Bobrick Washroom Equipment, Inc.; B-2012.
 - 2. Description: Automatic unit designed for dispensing soap in liquid or lotion form.
 - 3. Mounting: Wall-mounted.
 - 4. Capacity: 30 oz.
- E. Sanitary-Napkin Disposal Unit:
 - 1. Existing to be reinstalled.
- F. Grab Bars:
 - 1. Existing to be reinstalled.
- G. Robe Hook:
 - 1. Existing to be reinstalled.

2.3 CHANGING STATIONS

- A. Adjustable-Height Adult-Changing Station (OFCI):
 - 1. Owner-provided unit anticipated to be Pressalit 1000 Adjustable Adult Changing Table.
- B. Diaper-Changing Station:
 - 1. Existing to be reinstalled

2.4 UNDERLAVATORY GUARDS

- A. Refer to plumbing specifications for protection guards.

2.5 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six 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, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 10 2800

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SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: It is the intent of these specifications to provide complete and workable plumbing systems as shown on the accompanying plans and as specified herein except such parts as are specifically exempted herein. Provide all necessary supervision, coordination, labor, materials, equipment, fixtures, drayage, hoisting, tools, transportation, plant services and facilities, machinery and connections to utilities for the installation of complete and operable plumbing systems. If details or special conditions are required in addition to those shown on drawings, provide all material and equipment usually furnished with such systems or required to complete their installation, whether noted in plans and specification or not.
- B. Materials and labor shall be new (unless noted otherwise), first class and workmanlike and shall be subject at all times to the A/E's inspections, tests and approval from the commencement until the acceptance of the completed work.
- C. The layout shown on the drawings is diagrammatic but shall be followed as closely as other work will permit. The drawings provide design intent. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.
- D. Because of the scale of the Drawings, certain basic items, such as, pipe fittings, duct fittings, access panels, and sleeves, may not be shown. Where such items are required by Code or by other Sections, or where required for proper installation of the Work, such items shall be included, whether shown or not.
- E. In the event of any inconsistencies between the specifications, drawings, contract documents, applicable laws, statutes, ordinances, building codes, rules and regulations, the contractor shall provide the better quality or greater quantity of work and comply with or conform its work to the most stringent legal or contractual requirements.
- F. Changes from these drawings required to make this work conform to the building construction shall be made only with prior written approval of the Architect/Engineer. All proposed changes shall be shown on shop drawings. All measurements shall be verified by actual observation and all work shall fit in place meeting the approval of the Architect/Engineer.
- G. Equipment Specification may not deal individually with minute items required, such as, components, parts, controls, and devices which may be required to produce the equipment performance specified or as required to meet the equipment warranties. Where such items are required to make the system operational, they shall be included by the supplier of the equipment at no additional cost, whether or not specifically called for.

1.2 SECTION INCLUDES

- A. 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.
 - 1. Submittals
 - 2. Reference Standards
 - 3. Quality Assurance
 - 4. Lead Free Requirements

5. Guarantee
6. Work By Owner
7. Equipment Furnished By Others
8. Operation And Maintenance Instructions
9. Record Documents
10. Continuity Of Existing Services
11. Protection Of Finished Surfaces
12. Sealing And Firestopping
13. Off Site Storage
14. Regulatory Requirements
15. Certificates And Inspections
16. Coordination
17. Demolition And Existing Requirements
18. Request And Certification For Payment
19. Sleeves And Openings
20. Omissions
21. Definitions
22. Project/Site Conditions
23. Work Sequence And Scheduling
24. Salvage Materials
25. Training
26. Access Panels And Doors
27. Identification
28. Bedding And Backfill
29. Demolition
30. Excavation And Backfill
31. Concrete Work
32. Cutting And Patching
33. Lintels
34. Building Access
35. Equipment Access
36. Lubrication
37. Housekeeping And Clean Up
38. Sheeting, Shoring And Bracing
39. Dewatering
40. Rock Excavation
41. Surface Restoration

1.3 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this section.
- B. This section applies to all Division 22 sections of plumbing.

1.4 SUBMITTALS

- A. Submit shop drawings for equipment under each section per requirements listed in that section, as well as per Division 1.
- B. 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. Do not submit hard copies of web pages. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.

- C. On request from the A/E, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.
- D. 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.
- E. The submittals must be approved before fabrication is authorized.
- F. Provide electronic copies of all submittals for review. Electronic submittals shall be sent to wi@henneman.com for review.
- G. 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 is in agreement or indicate any discrepancies.
- H. The intent of the preceding paragraph is to find any discrepancies before they become difficult to correct.
- I. 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 owner's project representative for their use on this project.

Plumbing System Data Sheet:

Item	Pipe Service/Sizes	Manufacturer/Model No.	Remarks
Pipe			
Fittings			
Unions			
Valves			
Pipe Specialties			
Hangers & Supports			
Insulation			
Plumbing Specialties			
Plumbing Fixtures			
Plumbing Equipment			

- J. 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.
- K. Submit sufficient quantities of data sheets and shop drawings to allow the following distribution:

1. Operating and Maintenance Manuals	2 copies
2. Owner	1 copy
3. Architect/Engineer	2 copies

1.5 REFERENCE STANDARDS

A. Abbreviations of standards organizations referenced in this and other sections are as follows:

1. ABMA American Boiler Manufacturers Association
2. ACPA American Concrete Pipe Association
3. AGA American Gas Association
4. ANSI American National Standards Institute
5. AHRI Air Conditioning, Heating and Refrigeration Institute
6. ASME American Society of Mechanical Engineers
7. ASPE American Society of Plumbing Engineers
8. ASSE American Society of Sanitary Engineering
9. ASTM American Society for Testing and Materials
10. AWWA American Water Works Association
11. AWS American Welding Society
12. CISPI Cast Iron Soil Pipe Institute
13. CGA Compressed Gas Association
14. CS Commercial Standards, Products Standards Sections, Office of Eng. Standards Service, NBS
15. EPA Environmental Protection Agency
16. FS Federal Specifications, Superintendent of Documents, U.S. Government Printing Office
17. GAMA Gas Appliance Manufacturers Association
18. IAPMO International Association of Plumbing & Mechanical Officials
19. IEEE Institute of Electrical and Electronics Engineers
20. ISA Instrument Society of America
21. MICA Midwest Insulation Contractors Association
22. MSS Manufacturer's Standardization Society of the Valve & Fitting Industry, Inc.
23. NBS National Bureau of Standards
24. NEC National Electric Code
25. NEMA National Electrical Manufacturers Association
26. NFPA National Fire Protection Association
27. NSF National Sanitation Foundation
28. PDI Plumbing and Drainage Institute
29. STI Steel Tank Institute
30. UL Underwriters Laboratories Inc.

B. Standards referenced in this section:

1. ACI 614 Recommended Practice for Measuring, Mixing and Placing of Concrete
2. ASTM D1557 Standard Test Method for Moisture-Density Relations of Soils
3. ASTM E814 Standard Test Method for Fire Tests of Through-Penetration Fire Stops
4. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
5. UL1479 Fire Tests of Through-Penetration Firestops
6. UL723 Surface Burning Characteristics of Building Materials

1.6 QUALITY ASSURANCE

A. Substitution of Materials: Refer to Division 1 for equals and substitutions.

1. Where the following conflicts with Division 1, the requirements of Division 1 shall govern.

2. If the Contractor wishes to submit an alternate to the named manufacturers for any equipment, he may submit a voluntary alternative minimum 7 days prior to bid, stating the manufacturer's name, model number, written, detailed product data.
 3. Where materials or equipment are specified by name the proposed material or equipment must be identical to the specified material or equipment in all characteristics of quality, function and serviceability, regardless of application in the Project and, in addition, when the Architect deems that aesthetic significance is important, the equal material or equipment must be identical in all characteristics of visual appearance, design, color and texture. Any proposed equal shall be submitted to Architect/Engineer for prior approval, which Architect/Engineer may approve or disapprove in its sole discretion. Work performed or constructed with unapproved equals is at Contractor's risk and any required correction of work incorporating unapproved equals shall be at Contractor's sole cost and expense.
 4. In all instances, Contractor shall assume full responsibility for proof of equality of the statute to the equipment hereinafter specified. All data and information necessary for proof of equality, function and space requirements shall be prepared and accompany the submittal of the substitution to the Architect/Engineer. Approval by the Architect/Engineer of equipment other than the specified does NOT relieve Contractor of this responsibility.
- B. 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.
- C. 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, including, but not limited to, coordination with other trades and any required changes by other trades and for obtaining the intended performance from the system into which these items are placed.

1.7 LEAD FREE REQUIREMENTS

- A. All materials that contact potable water shall be lead free. Lead free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content $\leq 0.25\%$ per the Federal Safe Drinking Water Act as amended January 4th 2011 Section 1417.
- B. This requirement applies to all of the subsequent Plumbing Specification Sections and Plumbing Drawings and supersedes any part or model number that may conflict with this requirement.

1.8 GUARANTEE

- A. Refer to Division 1 for guarantees and warranties. In addition to the requirements in Division 1, this Contractor shall meet the following requirements.
- B. In entering into a contract covering this work, the contractor accepts the specifications and guarantees that the work will be carried out in accordance with the requirements of this specification or such modifications as may be made under the contract documents.
- C. Contractor further guarantees that the workmanship and material will be of the best procurable and that none but experienced workmen familiar with each particular class of work will be employed.

- D. Contractor further guarantees to replace and make good at his own expense, including travel time, all defects, which may develop within 1 year after final payment and acceptance by the Architect/Engineer, due to faulty workmanship or material, upon, receipt of written notification from the Owner.

1.9 WORK BY OWNER

THIS ARTICLE IS INTENDED TO ALERT THE CONTRACTOR OF WORK PERFORMED BY THE OWNER.

- A. Asbestos abatement will be performed by the Owner under separate contract.

1.10 EQUIPMENT FURNISHED BY OTHERS

- A. Receive, store and install equipment furnished by others. Make final connections as required for the completed project, including providing all necessary piping, valves, filters, backflow preventers, and other accessories, as may be required. Verify complete and updated list with General Contractor.

1.11 EXPLAIN WHAT SYSTEMS OR SUBSYSTEMS HAVE BEEN SIZED FOR FUTURE EXPANSION AND WHAT THE CONTRACTOR MUST DO TO MAINTAIN THESE PROVISIONS. THIS ARTICLE IS NOT NEEDED IF EQUIPMENT IS THE ONLY ITEM THAT HAS BEEN SIZED FOR FUTURE AND THE FUTURE CAPACITY OF THAT EQUIPMENT IS INDICATED ON SCHEDULES.

1.12 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Refer to Division 1 for all operations and maintenance instructions.
- B. In addition to the general content specified under Division 1 supply the following additional documentation:
 - 1. Copies of all approved submittals along with approval letters
 - 2. Records of tests performed to certify compliance with system requirements
 - 3. Manufacturer's wiring diagrams for electrically powered equipment
 - 4. Certificates of inspection by regulatory agencies
 - 5. Valve schedules
 - 6. Lubrication instructions, including list/frequency of lubrication
 - 7. Parts lists for fixtures, equipment, valves and specialties
 - 8. Manufacturers' installation, operation and maintenance recommendations for fixtures, equipment, valves and specialties
 - 9. Additional information as indicated in the technical specification sections

1.13 RECORD DOCUMENTS

- A. Refer to Division 1 for record documents.
- B. In addition to the general content specified under Division, follow the following procedures.
 - 1. During the progress of the work, Contractor shall maintain a current (daily) record set of the drawings and specifications, indicating thereon all work installed at variance with such Contract Documents including, without limitation, work covered by Addenda, Field Work Orders, Change Orders and Engineers additional instructions, interpretations and clarification. All changes or deviations from the original layout of the work and all critical dimensions of buried or concealed work shall be recorded. It shall be Contractor's responsibility to assure that said record sets are complete,

accurate and up-to-date, Engineer shall have the right to inspect and review such record sets.

2. At the completion of the work, Contractor shall indicate on record sets all record changes and such additional details necessary or appropriate to provide a complete reference document for use by Engineer. If variations and details cannot be shown clearly thereon, the Contractor shall prepare supplemental drawings adequate to impart the information. The foregoing drawings collectively shall constitute the "Record" drawings for the work.
3. All indication on "Record" drawings shall be executed in a legible manner at Contractor's cost, using methods and legend presentations compatible with the overall scheme of the record drawings with respect to scale, drawing sheet sizes and sequential indexing. All changes shall be marked clearly in red and clouded.
4. Engineer may review Contractor's "Record" drawings and notify Contractor of observed discrepancies or deviations. Contractor shall promptly correct discrepancies, deviations or illegible markups at Contractor's expense and resubmit revised drawings for Engineer review.

1.14 CONTINUITY OF EXISTING SERVICES

- A. 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.
- B. Each Contractor shall be thoroughly familiar with existing systems which will affect and be affected by relocation of existing equipment and installation of new lines and equipment. Contractor shall plan installation of their work so that interruptions of services to any building or portion thereof will be a minimum and such interruptions shall occur only when system is not required, if possible. If not possible, each Contractor shall insure the operation of services by whatever means possible, such as, installing bypasses, capping of services or providing temporary service. Each interruption shall be for as short a duration as possible.
- C. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours.
- D. This Contractor shall restore any circuit interruption as a result of this work to proper operation as soon as possible. Note that institutional operations are on a seven day week schedule.

1.15 PROTECTION OF FINISHED SURFACES

- A. Refer to Division 1.

1.16 SEALING AND FIRESTOPPING

- A. 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.
- B. Contractor shall request current life safety drawings from Architect/Owner.

1.17 OFF SITE STORAGE

- A. If payment will be requested for approved offsite stored material, then the Contractor shall complete an "Offsite Storage Agreement" which is available from the Owner. Prior approval by Owner's personnel for offsite storage will be needed. No material will be accepted for offsite storage unless submittals for the material have been approved.

1.18 REGULATORY REQUIREMENTS

- A. Comply with requirements of Wisconsin Administrative Code and local Authority Having Jurisdiction (AHJ) regarding materials and installation.

1.19 CERTIFICATES AND INSPECTIONS

- A. Refer to Division 1 for permits, regulations, utilities and taxes.
- B. Obtain and pay for all required local or State installation inspections except those provided by the Architect/Engineer in accordance with State code. Deliver originals of these certificates to the Owner. Include copies of the certificates in the Operating and Maintenance Instructions.
- C. Coordinate and provide inspections as required by the Authority Having Jurisdiction over the site.

1.20 COORDINATION

- A. Refer to Division 1 for coordination. In addition to the requirements specified under Division 1, the following requirements apply.
- B. It shall be the responsibility of each Contractor to coordinate and consult with each other to determine space requirements and to determine that adequate space for servicing is provided for all equipment whether furnished by the Contractor or others. The General Contractor shall have final decision on all space priority conflicts among Contractors. All space priority conflicts shall be brought to the attention of the Architect/Engineer and Owner's Representative.
- C. Each Contractor shall be thoroughly familiar with existing systems which will affect and be affected by relocation of existing equipment and installation of new lines and equipment. They shall plan installation of their work so that interruptions of services to any building or portion thereof will be a minimum, and such interruptions shall occur only when system is not required, if possible. If not possible, each Contractor shall insure the operation of services by whatever means possible, such as, installing bypasses, capping of services, or providing temporary service. Each interruption shall be for as short a duration as possible.
- D. Cooperation among all Contractors shall be required. Any Work that is installed without cooperating or coordinating with other Contractors and is in conflict shall be removed and reinstalled at that particular Contractor's cost. No cost additions to the Project will be considered due to a Contractor's lack of participation in the cooperation and coordination process. The following list of items of Work shall be the priority of order for all Contractors:
 - 1. Structure
 - 2. Recessed light fixtures
 - 3. Gravity-flow systems for sanitary, storm, steam and steam condensate piping
 - 4. Ductwork and appurtenances
 - 5. Electrical and low voltage cable tray
 - 6. Plumbing vent piping
 - 7. Fire protection (sprinkler system)

8. HVAC piping
 9. Medical gas piping
 10. Gas piping, process piping and domestic water
 11. Electrical conduit and low voltage conduit
 12. Control air lines or conduit
- E. The above list, in descending order, is the precedence assigned the Work items for space priority. Gravity-flow systems have first priority.
- F. Exception: Plumbing lines below or behind plumbing fixtures shall have precedence over all other work. Electrical conduit above or below switchgear, panelboards and control panels shall have precedence over all other work. Do not install any fluid conveying piping over electrical or elevator equipment.
- G. In the case of interconnection of the work of two or more contractors, verify at the site or on shop drawings all dimensions relating to such work. All errors due to the failure to so verify any such dimensions shall be promptly rectified.
- H. Any installed work that is not coordinated and interferes with another contractor's work shall be removed or relocated at the installing contractor's expense.
- I. Prior to start of Construction, General Contractor shall schedule a meeting with all Contractors responsible for work items listed above. The purpose of the meeting is to introduce the coordination program and determine its implementation in relation to the progress schedule.
- J. At initial Coordination Meeting, Mechanical Contractor/Ventilating Contractor shall provide to General Contractor outline drawings at 1/4" scale indicating column centerlines, interior partition locations, and ceiling heights. General Contractor shall verify all information shown on these drawings and relay any changes in the information to the Ventilation Contractor to be reflected on the Drawings. Ventilating Contractor, with reference and consideration to the Structural, Heating, Electrical, Fire Protection, and Plumbing Drawings, shall draw to scale his proposed installation showing duct sizes, equipment layouts, and dimensions from column lines and from finished floors to bottom of ducts. Ductwork shall be maintained as tightly as possible to the underside of floor slabs and/or beams. For congested areas Ventilating Contractor shall, in addition, prepare Drawings in section view. During this phase of the program, it shall be the Electrical Contractor's responsibility to furnish Ventilating Contractor with recessed lighting installation and clearance requirements. This information shall be outlined on Drawings by Ventilating Contractor.
- K. The ductwork layouts shall be produced in sequence as mandated by the Project Schedule. The earliest area indicated in the Schedule shall receive the first effort, etc.
- L. When the Ductwork Drawings for the earliest scheduled area have been completed (time limitation as determined at the initial coordination meeting), the Ventilating Contractor shall provide the General Contractor with one set of drawings for each participant in the effort. The General Contractor will distribute the drawings to the participating Contractors for their use in drawing thereon the major components of their proposed installation using the general scheme shown on the Contract Drawings as a guide.
- M. The major components to be indicated include (but are not limited to) the following:
1. Structure
 2. Roof drain leaders
 3. Above 3" waste piping
 4. Sprinkler mains
 5. Heating hot water mains

6. Chilled water mains
 7. Conveying systems
 8. Significant conduit runs
 9. Cable trays
 10. Contract ceiling heights
 11. Soffits
 12. Access points
 13. Fire wall penetrations
 14. Steam and condensate mains
 15. Gas, water, and process piping
- N. Information delineated shall be distance from column centerlines, pipe/equipment size, and distance from finished floor to bottom of pipe/equipment and hangers. Included on the Drawings shall be piping layout with hanger locations and hanger point loads. This information shall be developed satisfactorily enough to allow Structural Engineer to verify the adequacy of the structural system for the projected loads. The hanger locations may have to be moved depending on the structural system review. No hanger shall be fabricated and/or installed until hanger locations are reviewed and accepted by Architect/Engineer.
- O. Within a period not to exceed two weeks after distribution of the drawings, the General Contractor will schedule a meeting with the Architect/Engineer and participating Contractors at which time areas of conflict shall be resolved. The drawings shall be overlaid to identify areas of conflict. All parties shall then cooperate in resolving the conflicts. Records of the agreements shall be entered on the Ventilating Contractor's drawings, acknowledged by all participants by signature in space provided for this purpose, and two copies distributed to all involved parties. All coordination drawing preparation and reproduction costs shall be borne by the Ventilating Contractor. The above drawings, review, and coordination process shall be repeated until all areas on the Project have been coordinated.
- P. In the event a Contractor fails to cooperate in the Coordination Program, they shall be held responsible for all costs incurred for adjustments to the work of others made necessary to accommodate the uncooperative Contractor's installations.

1.21 DEMOLITION AND EXISTING REQUIREMENTS

- A. Existing active services: water, gas, medical gas, steam, ventilation, compressed or control air, sanitary waste, sanitary vent, storm electric, and any other building systems when encountered shall be protected against damage. Where existing services are to be abandoned, the services shall be removed back to the point of origin and removed from the site unless otherwise directed by the Owner's Representative.
- B. Submit a "Sequence of Work Schedule" in respect to all temporary and permanent utility and service cutovers after final determination. This schedule shall be submitted for approval to the Owner and Architect/Engineer. The submittal shall designate priority order, service or utility affected, date of cutover, and time of day to start and finish.
- C. Bidders should inspect the site to become familiar with conditions of the site which will affect the Work. Bidders should verify points of connection with utilities, routing of outside piping to include required clearances from any existing structures, or other obstacles.
- D. Extra payment will not be allowed for changes in the Work required because of the successful bidder's failure to make this inspection.

1.22 REQUEST AND CERTIFICATION FOR PAYMENT

- A. Within 10 days after Notice to Proceed, the successful bidder will submit to the Owner's Project Representative in a form prescribed by Division 1, a cost breakdown of the proposed values for work performed which, if approved by the owner, will become the basis for construction progress and monthly payments. The cost breakdown items shall reflect actual work progress stages as closely as feasible.
- B. 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.

1.23 SLEEVES AND OPENINGS

- A. Openings required in new or existing construction that may be necessary for the installation of new work shall be provided by the respective contractor and all patching and repairing shall be done by workmen competent in the trade required, at the expense of the respective contractor. The respective contractor shall be responsible for arranging the work so that minimum cutting will be required. All rubbish and excess materials involved in such cutting shall be promptly removed from the site and disposed of by the contractor. Cutting through the floor or roof systems or load bearing walls shall be done only with the prior written approval of the Architect/Engineer so as to avoid damaging the structural system.

1.24 OMISSIONS

- A. No later than ten (10) days before bid opening, the Contractor shall call the attention of the A/E to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

1.25 DEFINITIONS

- A. Wherever the words "the Contractor", "this Contractor" or "Plumbing Contractor" appear in this division, they refer to the Contractor for Plumbing work.
- B. The term "provide" includes such labor, methods, materials, equipment and transportation or other facilities required to complete the Contract and the performance of all duties thereby upon the Contractor.

1.26 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of A/E before proceeding.
- C. Tools, materials and equipment shall be confined to areas designated by the Owner's project representative.

1.27 WORK SEQUENCE AND SCHEDULING

- A. Install work in phases to accommodate Owner's occupancy requirements. During the construction period coordinate schedule and operations with Owner's Construction Representatives.

1.28 SALVAGE MATERIALS

- A. 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.

1.29 TRAINING

- A. The contractor shall have the following responsibilities:
 - 1. Provide a training plan sixty days before the planned training covering the following elements:
 - a. Equipment
 - b. Intended audience
 - c. Location of training
 - d. Objectives
 - e. Subjects covered (description, duration of discussion, special methods, etc.)
 - f. Duration of training on each subject
 - g. Instructor for each subject
 - h. Methods (classroom lecture, manufacturer's quality video, site walk-through, actual operational demonstrations, written handouts, etc.)
 - 2. Provide designated owner personnel with comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment that makes up the system.
 - 3. Training shall normally start with classroom sessions followed by hands-on demonstration/training on each piece of equipment.
 - 4. During any demonstration, should the system fail to perform in accordance with the requirements of the O&M manual or sequence of operations, the system shall be repaired or adjusted as necessary and the demonstration repeated at another scheduled time, if necessary.
 - 5. The appropriate trade or manufacturer's representative shall provide the instructions on each major piece of equipment. Practical building operating expertise as well as in-depth knowledge of all modes of operation of the specific piece of equipment are required. More than one party may be required to execute the training.
 - 6. The controls contractor shall attend sessions other than the controls training, as specified, to discuss the interaction of the controls system as it relates to the equipment being discussed.
 - 7. The training sessions shall follow the outline in the table of contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
 - 8. Training shall include:
 - a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
 - b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include startup, operation in all modes possible, shutdown, seasonal changeover and any emergency procedures.
 - c. Discussion of relevant health and safety issues and concerns.
 - d. Discussion of warranties and guarantees.
 - e. Common troubleshooting problems and solutions.

- f. Explanatory information included in the O&M manuals.
 - g. Discussion of any peculiarities of equipment installation or operation.
 - h. Classroom sessions shall include the use of overhead projections, slides, video/audio-taped material as might be appropriate.
 - i. Hands-on training shall include startup, operation in all modes possible, including manual, shut-down, alarms, power failure and any emergency procedures, and preventative maintenance for all pieces of equipment.
9. The contractor shall fully explain and demonstrate the operation, function and overrides of any local packaged controls not controlled by the central control system.
- B. Video recording of the training sessions will be provided by the contractor and added to the O&M manuals. In addition, factory training videos identifying key troubleshooting, repair, service and/or replacement techniques shall be provided and reviewed with the owner.
- C. Provide a minimum of 2 hours of instruction.
- D. Provide additional training as specified in other specification sections for specific equipment.

PART 2 – PRODUCTS

2.1 ACCESS PANELS AND DOORS

- A. Lay-in Ceilings:
- 1. Removable lay-in ceiling tiles in 2 X 2 foot or 2 X 4 foot configuration provided under Division 9 are sufficient; no additional access provisions are required unless specifically indicated.
- B. Plaster Walls and Ceilings:
- 1. 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".

2.2 IDENTIFICATION

- A. Manufacturers: EMED Company, W.H. Brady, Seton Nameplate Company, Thor Enterprises, Carlton, MSI Marking Services.
- B. Engraved Name Plates:
- 1. White letters on a black background, 1/16 inch thick plastic laminate, beveled edges, screw mounting.
- C. Snap-Around Pipe Markers:
- 1. One-piece, preformed, vinyl construction, snap-around or strap-around pipe markers with applicable labeling and flow direction arrows, 3/4" min. size for lettering. Provide nylon ties on each end of pipe markers.

D. Valve Tags:

1. Round brass tags with 1/2 inch numbers, 1/4 inch system identification abbreviation, 1-1/4 inch minimum diameter, with brass jack chains, brass "S" hooks or one piece nylon ties around the valve stem.

E. Underground Warning Tape:

1. Detectable underground warning tape, 5.0 mil overall thickness, 6" width, .0035" thick aluminum foil core with polyethylene jacket bonded to both sides. Color code tape and print caution along with name of buried service in bold letters on face of tape.
2. Underground Tracer Wire:
3. All underground non-metallic sewers/mains and water services/mains shall be provided with tracer wire installations. Tracer wire shall be continuous solid copper or steel plastic coated with split bolt or compression-type connectors.

2.3 BEDDING AND BACKFILL

- A. 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

- B. Backfill above the bedding in lawn areas shall be thoroughly compacted excavated material free of large stones, organic, perishable, and frozen materials.
- C. 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.

2.4 SLEEVES AND OPENINGS

A. General:

1. Pipe sleeves shall be constructed of standard weight ASTM A53 or ASME B36.10 steel with an anchor plate constructed of A36/A36M steel welded to the pipe. The sleeve shall be sized a minimum of 1" larger than piping insulation diameter. The entire assembly shall be hot-dip galvanized after fabrication.
2. Duct sleeves and piping sleeves passing through interior walls shall be constructed of 24 gauge galvanized steel minimum thickness.

B. Sleeves Through Below Grade Walls:

1. Provide steel pipe sleeve, ASTM A53, pressure sealing with membrane clamp ring, gasket, water stop ring, external rings, and nitrile rubber link seals. The assembly shall be hot-dip galvanized after fabrication.
 - a. Seals: Modular mechanical type seals, consisting of interlocking nitrile rubber links shaped to continuously fill the annular space between the pipe and the sleeve and electrically isolate the carrier pipe from the steel sleeve.
 - b. Sealing Element: Polychloroprene rubber material compounded to resist aging, ozone, sunlight, hydrocarbon gases, water, and chemical action.

- c. Hardware: Type 300 series stainless steel fasteners. Threads rolled to produce smooth uniform threads and unbroken flow lines.
 - d. Compression Plates: Fiberglass-reinforced polyester plastic, injection molded for high physical properties, dielectric strength and non-cold flow creep characteristics, having high resistance to acidic and alkaline soils.
2. For sleeves located 15 feet or more below grade provide cast iron sleeve ASTM A74 with compression seals.

2.5 SEALING AND FIRESTOPPING

A. Fire and/or Smoke Rated Penetrations:

1. Manufacturers: 3M, Hilti, Rectorseal, STI/SpecSeal, Tremco.
2. All firestopping systems shall be provided by the same manufacturer.
3. Fire stop systems shall be UL listed or tested by an independent testing laboratory approved by the Owner and the Authority Having Jurisdiction (AHJ).
4. 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.
5. 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.
6. 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.
7. All sealants shall meet the intent of LEED® VOC requirements, <250 g/L VOC contents (less H₂O and exempt solvents).

B. Non-Rated Penetrations:

1. 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 interior of the building.
2. Pipe Penetrations: 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

3.1 DEMOLITION

- A. 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.

- B. 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 owner 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.
- C. All contractors requiring the personnel/ material hoist and or temporary construction elevator (i.e. new elevators, temporarily protected) at times other than outlined in the temporary facilities specifications will make arrangements directly with the general contractor. The general contractor is responsible for all coordination and scheduling of the use of any hoisting equipment so the flow of the project is smoothly maintained and all workers have access to the work areas to perform their work and deliver material to the areas needed according to the project schedule.
- D. If any contractor's work requires the removal and replacement of any finished materials including but not limited to such materials as ceiling tiles, wall finishes, cabinets, doors, flooring, windows, etc. after those items are installed, each contractor will be responsible, at no additional cost to the owner, to replace any damaged, soiled or lost materials with new materials to match the existing materials and those materials damaged.

3.2 EXCAVATION AND BACKFILL

- A. 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.
- B. 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.
- C. Strip topsoil from area to be excavated, free from subsoil and debris, and store for later respreading.
- D. At no time place excavated materials where they will impede surface drainage unless such drainage is being safely rerouted away from the excavation.
- E. 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.
- F. Remove surplus excavated materials from site.
- G. 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.

- H. 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.
- I. 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.
- J. Install lines passing under foundations with minimum of 1-1/2 inch clearance to concrete and insure there is no disturbance of bearing soil.
- K. 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.
- L. 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.

3.3 CONCRETE WORK

- A. 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.
- B. 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.

3.4 CUTTING AND PATCHING

- A. Refer to Division 1 for cutting and patching. In addition to the requirements in Division 1:
- B. Each Contractor shall coordinate the placing of openings in the new structure as required for the installation of each Contractor's work.
- C. Each Contractor shall furnish to the General Contractor the accurate locations and sizes for required openings in the new work, but this shall not relieve each Contractor of the responsibility of checking to assure that properly sized openings are provided. When additional patching is required due to the Contractor's failure to inspect this work, then the Contractor shall make arrangements for the patching required to properly close the openings to include patch painting, and the Contractor shall pay any additional cost incurred in this respect.
- D. If cutting and patching of the new structure is made necessary due to the Contractor's failure to install piping, ducts, sleeves, or equipment on schedule, or due to the Contractor's failure to furnish on schedule the information required for the leaving of openings, then it shall be the Contractor's responsibility to make arrangements and obtain approval from the General Contractor and Architect/Engineer for this cutting and patching, and the Contractor

shall pay any additional cost incurred in this respect. The Contractor shall also reimburse the Owner for any additional costs incurred to the Architect/Engineer for additional services caused by the Contractor in this respect.

- E. The Contractor shall provide cutting and patching and patch painting in the existing structure as required for the installation of his Work and shall furnish lintels and supports as required for openings. Cutting of structural support members will not be permitted without prior approval of the Architect/Engineer. Extent of cutting shall be minimized; use core drills, power saws, or other machines which will provide neat, minimum openings. Patching shall match adjacent materials and surfaces and shall be performed by craftsmen skilled in the respective craft required.

3.5 LINTELS

- A. All steel lintels required for opening in existing and/or new masonry walls shall be provided under section 05 50 00 – Metal Fabrications. This contractor shall design, fabricate, and install all lintels required in masonry walls for duct and pipe penetrations. Contractor shall submit design drawings of lintels with professional engineers seal and signature prior to installation.

3.6 BUILDING ACCESS

- A. 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.

3.7 EQUIPMENT ACCESS

- A. 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.
- B. Provide color coded thumb tacks or screws, depending on the surface, for use in accessible ceilings which do not require access panels.

3.8 COORDINATION

- A. 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.
- B. Verify that all devices are compatible for the type of construction and surfaces on which they will be used.

3.9 IDENTIFICATION

- A. 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.
- B. 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.

- C. Identify valves with brass tags bearing a system identification and a valve sequence number. Identify medical gas and vacuum valves with brass tags and wall or cabinet mounted color coded engraved nameplate with the following "(Type of Gas) Shutoff Valve for (Location or Zone)". Valve tags are not required at a terminal device unless the valves are greater than ten feet from the device, located in another room or not visible from device. Provide a typewritten valve schedule and pipe identification schedule indicating the valve number and the equipment or areas supplied by each valve and the symbols used for pipe identification; locate schedules in mechanical room and in each Operating and Maintenance manual. Schedule in mechanical room to be framed under clear plastic.

3.10 LUBRICATION

- A. 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 with 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.

3.11 SLEEVES AND OPENINGS

A. General:

1. Sleeves are not required for piping and ducts passing through interior non-rated drywall, plaster, or wood partitions and interior poured concrete walls that have been saw cut or core drilled.
2. Pack annular space between sleeves and pipe or ducts with fiberglass insulation and seal.
3. Piping sleeves that pass through fire rated floors, walls, or ceilings shall be provided with a UL listed fire stop material meeting UL 1479 to seal the opening between the pipe and the pipe sleeve to maintain the fire rating.
4. Provide escutcheon plates on piping to cover sleeve and insulation in finished areas.
5. Refer to Division 1, General Requirements for additional information on sleeves and openings.

B. Sleeves Through Floors/Ceilings:

1. Sleeves shall be installed to extend 1 inch above finished floor with a watertight sealant between floor and sleeve in all mechanical rooms and wet rooms listed below.
2. If a sleeve is not provided, provide 1-1/2 inch angle ring with urethane caulk between the angle and the floor and seal at the corners to form a watertight seal.
 - a. Wet Locations: Edit list for each project
 - 1) Mechanical Rooms
 - 2) Food service/kitchen areas (behind/under equipment, cabinets, tables, etc.)

3.12 SEALING AND FIRESTOPPING

- A. The Contractor shall refer to building life safety drawings for all smoke and fire rates in addition to the mechanical drawings. Any discrepancies shall be brought to the attention of the Architect/Engineer before final addendum.
- B. Fire and/or Smoke Rated Penetrations:

1. Install approved product in accordance with 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.
2. 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.

C. Non-Rated Partitions:

1. 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 with manufacturer's instructions.
2. 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.

3.13 HOUSEKEEPING AND CLEAN UP

- A. 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.

3.14 SHEETING, SHORING AND BRACING

- A. Provide shoring, sheet piling and bracing in conformance with the Building Code to prevent earth from caving or washing into the excavation. Shore and underpin to properly support adjacent or adjoining structures. Abandon in place shoring, sheet piling and underpinning below the top of the pipe, or, if approved in advance by the engineer, maintained in place until other permanent support approved by the engineer is provided.

3.15 DEWATERING

- A. Provide, operate and maintain all pumps and other equipment necessary to drain and keep all excavation pits, trenches and the entire subgrade area free from water under all circumstances. Obtain well permit from the Wisconsin Department of Natural Resources district office for dewatering wells discharging more than 70 GPM. Comply with permit requirements.

3.16 ROCK EXCAVATION

- A. Remove rock encountered in the excavation to a minimum dimension of six (6) inches outside the pipe. Rock excavation includes all hard, solid rock in ledges, bedded deposits and unstratified masses, all natural conglomerate deposits so firmly cemented as to present all the characteristics of solid rock, which material is so hard or so firmly cemented that in the opinion of the Engineer it is not practical to excavate and remove same with a power shovel except after thorough and continuous drilling and blasting. Rock excavation includes rock boulders of 1/2 cubic yard or more in volume.
- B. Rock excavation will be computed on the basis of the depth of rock removed and a trench width two (2) feet larger than the outside diameter of the pipe where one (1) pipe is laid in the trench and three (3) feet larger than the combined outside diameter where two (2) pipes are laid in the trench. Include 6" pipe and structure bedding in rock excavation. Include rock excavation shown on the plans in the Base Bid.

3.17 SURFACE RESTORATION

- A. Completely restore the surface of all disturbed areas to a like condition of the surface prior to the work. Level off all waste disposal areas and clean up all areas used for the storage of materials or the temporary deposit of excavated earth. Remove all surplus material, tools and equipment.
- B. Lawns: Topsoil with 4" of clean, friable, fertile topsoil, free from debris, lumps, rocks, roots, plants and seeds. Grade surfaces to match adjacent elevations. Rake smooth, free of lumps and debris. Sod with good quality nursery sod, uniform, dense, free from weeds and consisting of approximately 60% Kentucky blue grass and the balance perennial rye, fescue and white clover. Place sod with joints staggered and abutting. Maintain lawn areas for one month after installation. Contractor will be responsible for necessary watering and mowing. Do necessary weeding, repair, reseeding or resodding until uniform catch is obtained.
- C. Curb and Gutter: Concrete curb and gutter conforming to local requirements.
- D. Sidewalk and Walkways: Non-reinforced concrete conforming to local requirements, thickness to match existing, cross slope of one-fourth inch per foot, scored into squares approximately equal to width.
- E. Bituminous Concrete Pavements: 4" thick crushed stone base course and two pass bituminous concrete pavement, first course 1-1/2" binder, second course 1-1/2" surface.

END OF SECTION 22 0500

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SECTION 22 05 14 - PLUMBING SPECIALTIES

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: Unless noted otherwise, the Plumbing Contractor shall provide all labor and materials for a complete system in this specification section.

1.2 SECTION INCLUDES

- A. This section includes specifications for floor drains, roof drains, cleanouts, backflow preventers, water hammer arrestors and other miscellaneous plumbing specialties.
 - 1. Floor Drains
 - 2. Cleanouts
 - 3. Trap Guards

1.3 RELATED WORK

- 1. Applicable provisions of Division 1 shall govern work under this section.
- B. Section 22 05 23 – General-Duty Valves for Plumbing Piping
- C. Section 22 11 00 – Facility Water Distribution
- D. Section 22 13 00 – Facility Sanitary Sewerage

1.4 SUBMITTALS

- A. Refer to Section 22 05 00 – Common Work Results for Plumbing. In addition to the general content specified under Section 22 05 00 – Common Work Results for Plumbing, supply the following submittals:
 - 1. Floor Drains
 - 2. Cleanouts
 - 3. Trap Guards
- B. Include data concerning dimensions, capacities, materials of construction, ratings, certifications, weights, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.

1.5 REFERENCE STANDARDS

- A. ANSI A112.21.1 - Floor Drains.
- B. ASSE 1072 - Barrier Type Floor Drain Trap Seal Protection.

1.6 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Division 1.
- B. Plumbing products requiring approval by the State of Wisconsin Dept. of Safety & Professional Services must be approved or have pending approval at the time of shop drawing submission.

1.7 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified in Section 22 05 00 – Common Work Results for Plumbing.

PART 2 – PRODUCTS

2.1 FLOOR DRAINS

- A. Manufacturer: Josam, Smith, Wade, Watts, Zurn
- B. Refer to drain schedules on plumbing plans for additional information.

2.2 CLEANOUTS

- A. Manufacturer: Josam, Smith, Wade, Watts, Zurn
- B. 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.
- C. 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.
- D. Interior Vinyl Tile Floor Areas: Enameled cast iron body with round adjustable scoriated nickel bronze cover, tapered threaded ABS closure plug. Zurn ZN-1400.
- E. 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.
- F. Interior Finished Wall Areas: Line type cleanout tee with tapered threaded ABS cleanout plug, round polished stainless steel access cover secured with machine screw. Screw shall not pass completely through ABS plug, trim screw as necessary. Zurn Z-1446.
- G. Interior Exposed Vertical Stacks: Line type cleanout tee with tapered threaded ABS closure plug. Zurn Z-1445.
- H. Interior Horizontal Lines: Cast iron hub with tapped ferrule and tapered threaded ABS or PVC closure plug, or no-hub coupling and blind plug.

2.3 TRAP GUARDS

- A. Manufacturers: ProSet Systems Trap Guard, Rectorseal SureSeal, PPP Pro-Drain, Mifab
- B. Flexible elastomeric PVC construction diaphragm trap guard for installation in new and existing floor drains, hub drains, and trench drains, ASSE 1072. Trap guard to prevent trap evaporation and waste backflow. Size as applicable to the drain outlet size.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Coordinate location and setting of plumbing specialties with adjacent construction. Install in accordance with manufacturers recommendations.
- B. Set floor drains level and plumb adjusted to finished floor elevation. Locate where serviceable.

- C. Set cleanouts level and plumb adjusted to finished floor 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.
- D. Install trap guards and/or trap primer connections where indicated.
- E. Provide deep seal traps on floor drains and hub drains installed in mechanical rooms, penthouses, or rooms with excessive positive or negative pressure.
- F. Floor drains and hub drains installed in public restrooms, locker rooms, seldom used rooms, and areas with minute drainage flow shall have installations of trap guards or trap primers.

END OF SECTION 22 0514

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SECTION 22 05 23 - GENERAL DUTY VALVES FOR PLUMBING PIPING

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: Unless noted otherwise, the Plumbing Contractor shall provide all labor and materials for a complete system in this specification section.

1.2 SECTION INCLUDES

- A. This section includes valve specifications for all Plumbing systems except where indicated under Related Work.
 - 1. Water System Valves
 - a. Ball Valves
 - b. Butterfly Valves
 - c. Swing Check Valves
 - d. Balancing Valves
 - e. Drain Valves
 - f. Spring Loaded Check Valves
 - 2. Specialty Valves And Valve Accessories
 - a. Gauge Valves
 - b. Safety Relief Valves

1.3 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this section.
- B. Section 22 05 14 – Plumbing Specialties
- C. Section 22 11 00 – Facility Water Distribution
- D. Section 22 13 00 – Facility Sanitary Sewerage

1.4 SUBMITTALS

- A. Refer to Section 22 05 00 – Common Work Results for Plumbing, Submittals. In addition to the general content specified under Section 22 05 00 – Common Work Results for Plumbing, supply the following submittals:
 - 1. Water System Valves
 - a. Ball Valves
 - b. Butterfly Valves
 - c. Swing Check Valves
 - d. Balancing Valves
 - e. Drain Valves
 - f. Spring Loaded Check Valves
 - 2. Specialty Valves And Valve Accessories

- a. Gauge Valves
 - b. Safety Relief Valves
- B. 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.

1.5 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Division 1.

1.6 DESIGN CRITERIA

- A. ANSI Z21.22 - Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- B. Where valve types (ball, butterfly, etc.) are specified for individual plumbing services (i.e. domestic water, gas, etc.), each valve type shall be of the same manufacturer unless prior written approval is obtained from the Owner.
- C. Valves to be line size unless specifically noted otherwise.
- D. Valves installed in potable water lines to be NSF/ANSI 61 lead free compliant.

1.7 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified in Section 22 05 00 – Common Work Results for Plumbing.

PART 2 - PRODUCTS

2.1 WATER SYSTEM VALVES

- A. Manufacturers: Apollo, Asco, Conbraco, Crane, Hammond, Jomar, Milwaukee Valve, Nibco, Stockham, Watts
- B. All water system valves to be rated at not less than 125 water working pressure at 240 degrees F unless noted otherwise.
- C. Ball Valves:
- 1. 3" and smaller: Two piece bronze body; full port, sweat or threaded 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 77CLF-A, Milwaukee UPBA400/450, Nibco TS-585-80-LF, Watts LFB-6080/6081-G2.
 - a. Press Fit: Only where specifically permitted elsewhere in these specifications, product is to meet above requirements. Nibco PC-585-80-LF.
- D. Butterfly Valves:
- 1. 2-1/2" and larger: Cast or ductile iron body; stainless steel shaft; bronze, copper or Teflon bushings; EPDM resilient seat; EPDM seals; bronze, aluminum-bronze, EPDM encapsulated ductile iron or stainless steel disc. 200 psig WOG through 12", 150 psig WOG through 24". Valve assembly to be bubble tight to 175 psig with no downstream flange/pipe attached. Use tapped lug type valves with stud bolts or cap screws, or

grooved end connection valves, permitting removal of downstream piping while using the valve for system shutoff. Provide 10 position locking lever handle actuators for valves 6" and smaller. Provide worm gear operators with external position indication for valves 8" and larger. Hammond 5200 or 6200 series, Milwaukee M or C series, Nibco LD2000/LC2860, Victaulic 608, Watts BF-03-M2.

E. Swing Check Valves:

1. 3" and smaller: Bronze body, sweat or threaded ends, Y-pattern, renewable PTFE seat and disc, Class 125, suitable for installation in a horizontal or vertical line with flow upward. Nibco TS-413-Y-LF
2. 4" and larger: Cast iron body, flanged ends, bronze trim, bolted cap, renewable bronze seat and disc, Class 125, non-asbestos gasket, suitable for installation in a horizontal or vertical line with flow upward. Nibco F918B

F. Balancing Valves:

1. 2" and smaller: Two 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 deg F. Nibco TS-580-80-LF, Hammond UP8501-02 or UP8511-02, Milwaukee UPBA-100MS or UPBA-150MS or equal by Apollo, Watts.
2. 2" and smaller: Lead free brass body with sweat or threaded ends, type 304 stainless steel ball, glass filled TFE seat, two capped pressure differential read-out ports, tapped and plugged drain port, with adjustable memory stop position indicator, rated for 200 psig at 250 deg F. Deliver two manufacturer provided circular plastic valve calculator charts. Bell & Gossett Circuit Setter Plus, CB or RF Series.
3. 2" and smaller: Thermostatic, automatically and continuously adjusts flow to maintain desired temperature, lead free 303 stainless steel body and actuator with threaded ends, EPDM rubber O-ring, 200 psig at 250 deg F. Manual balancing of valve not required. Valve does not close completely, with minimum listed Cv 0.1 at closed position. ThermOmegaTech Circuit Solver, CS Series.

G. Drain Valves:

1. 3/4" ball valve with integral threaded hose adapter, sweat or threaded inlet connections, with threaded cap and chain on hose threads. Apollo 70LF-200-HC, Milwaukee UPBA-100H or UPBA-150H, Hammond UP8501H or UP8511H, or equal by Nibco or Watts

H. Spring Loaded Check Valves:

1. 2" and smaller: Bronze body, sweat or threaded ends, bronze trim, stainless steel spring, stainless steel center guide pin, Class 125, PTFE seat unless only bronze available. Apollo 61LF, Nibco TS-480-Y-LF, Watts LF600, Zurn 40XL2
2. 2-1/2" and larger: Cast or ductile iron body, wafer or globe type, bronze trim, bronze or EPDM seat, stainless steel spring, stainless steel stem if stem is required, Class 125. Nibco W910 or F910
3. 3/8" compression: Downstream of fixture stop valve, compression x compression, NSF/ANSI 372 low lead: Chicago 243.315.AB.1

2.2 SPECIALTY VALVES AND VALVE ACCESSORIES

- A. Gauge Valves: Use 1/4" ball valves. Needle valves and gauge cocks will not be accepted.
- B. Safety Relief Valves:

1. Manufacturers: Bell & Gossett, Apollo/Conbraco, Watts, Zurn/Wilkins
2. Bronze body, temperature and pressure actuated stainless steel stem and spring, thermostat with non-metallic coating, test lever, suitable for 125 psig water working pressure at 240 degrees F, sized for full BTUH input and operating pressure of equipment, with valve capacity on metal label. For equipment less than or equal to 200,000 BTUH input, provide AGA, UL or ASME listed and labeled valve. Provide ASME listed and labeled valve for larger equipment. Temperature and pressure relief valve shall be sized using the AGA steam temperature rating per SPS 382.40(5)(d).

PART 3 – EXECUTION

3.1 GENERAL

- A. 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.
- B. Mount valves in locations which allow access for operation, servicing and replacement.
- C. Provide valve handle extensions for all valves installed in insulated piping.
- D. 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.
- E. Prior to flushing of piping systems, place all valves in the full-open position.

3.2 SHUT OFF VALVES

- A. Install shut-off valves at each piece of equipment, at each branch take-off from mains for isolation or repair and elsewhere as indicated.

3.3 BALANCING VALVES

- A. Install where indicated on the drawings and details for balancing of flow in pumped hot water recirculation piping systems.
- B. 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.

3.4 DRAIN VALVES

- A. 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.

3.5 SPRING LOADED CHECK VALVES

- A. Install a spring loaded check valve in each circulating pump discharge line, each clearwater sump pump discharge line and elsewhere as indicated.

3.6 SWING CHECK VALVES

- A. Install swing check valves in recirculation branch lines and elsewhere as indicated. Provide weighted swing check valves at sanitary sump pump discharges.

3.7 SAFETY RELIEF VALVES

- A. Install relief valves on all pressure vessels and elsewhere as indicated. Inlet and outlet piping connecting to valves must be the same size as valve connections or larger. Pipe discharge to drain where indicated or to floor.

END OF SECTION 22 0523

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SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: Unless noted otherwise, the Plumbing Contractor shall provide all labor and materials for a complete system in this specification section.

1.2 SECTION INCLUDES

- A. This section includes specifications for supports of all plumbing equipment and materials as well as piping system anchors.
 - 1. Structural Supports
 - 2. Pipe Hangers And Supports
 - 3. Pipe Hanger Rods
 - 4. Beam Clamps
 - 5. Concrete Inserts
 - 6. Continuous Concrete Insert Channels
 - 7. Anchors
 - 8. Corrosive Atmosphere Coatings

1.3 RELATED WORK

- A. Applicable provisions of Division 1 shall govern work under this section.
- B. Section 03 10 00 – Concrete Formwork for equipment pads
- C. Section 03 30 00 – Cast-in-Place Concrete for equipment pads
- D. Section 22 07 00 – Plumbing Insulation for insulation protection at support devices

1.4 SUBMITTALS

- A. Refer to Section 22 05 00 – Common Work Results for Plumbing. In addition to the general content specified under Section 22 05 00 – Common Work Results for Plumbing, supply the following submittals:
 - 1. Structural Supports
 - 2. Pipe Hangers And Supports
 - 3. Pipe Hanger Rods
 - 4. Beam Clamps
 - 5. Concrete Inserts
 - 6. Continuous Concrete Insert Channels
 - 7. Anchors
 - 8. Corrosive Atmosphere Coatings
- B. Schedule of all hanger and support devices indicating attachment methods and type of device for each pipe size and type of service.
- C. All submittals are to comply with submission and content requirements specified within Section 22 05 00 – Common Work Results for Plumbing.

1.5 REFERENCE STANDARDS

- A. MSS SP-58 Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, And Installation.

1.6 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Division 1.

1.7 DESCRIPTION

- A. Provide all supporting devices as required for the installation of plumbing equipment and materials. All supports and installation procedures are to conform to the latest requirements of the ANSI Code for building piping.
- B. Do not hang any plumbing item directly from a metal deck or run piping so its rests on the bottom chord of any truss or joist.
- C. Fasteners depending on soft lead for holding power or requiring powder actuation will not be accepted.
- D. 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.
- E. Protect insulation at all hanger points; see Related Work above.

1.8 DESIGN CRITERIA

- A. Materials and application of pipe hangers and supports shall be in accordance with MSS Standard Practice SP-58 unless noted otherwise.
- B. 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

2.1 STRUCTURAL SUPPORTS

- A. Provide all supporting steel required for the installation of plumbing 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.

2.2 PIPE HANGERS AND SUPPORTS

- A. Manufacturers: Anvil, B-Line, Grinnell, Pate, Piping Technology, Roof Products & Systems.
- B. Hangers for Pipe Sizes 1/2" through 2":
 - 1. Carbon steel, adjustable swivel ring.
 - 2. Carbon steel, adjustable clevis, standard.
- C. Hangers for Pipe Sizes 2" and Larger:
 - 1. Carbon steel, adjustable clevis, standard.

- D. Multiple or Trapeze Hangers:
 - 1. Steel channels with welded spacers and hanger rods.
- E. Wall Support:
 - 1. Carbon steel welded bracket with hanger.
 - 2. 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. 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.
- F. Vertical Support:
 - 1. Carbon steel riser clamp for above floor use.
- G. Floor Support:
 - 1. Carbon steel pipe saddle, stand and bolted floor flange.
- H. Copper Pipe Supports:
 - 1. 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.

2.3 PIPE HANGER RODS

- A. Steel Hanger Rods:
 - 1. Threaded both ends, threaded one end, or continuous threaded, complete with adjusting and lock nuts.
 - 2. Size rods for individual hangers and trapeze support as indicated in the following schedule.
 - 3. 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
2710	3/4
3770	7/8
4960	1
8000	1-1/4

2.4 BEAM CLAMPS

- A. 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. 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.

2.5 CONCRETE INSERTS

- A. Drilled Fasteners:
 - 1. Carbon steel expansion anchors, vibration resistant, with ASTM B633 zinc plating. Use drill bit of same manufacturer as anchor. Hilti, Rawl, Redhead.

2.6 CONTINUOUS CONCRETE INSERT CHANNELS

- A. Steel inserts with an industry standard pre-galvanized finish, nominally 1-5/8 inch wide 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 the channel inserts may be used. Select insert length to accommodate all pipe in the area.

2.7 ANCHORS

- A. Use welding steel shapes, plates, and bars to secure piping to the structure.

2.8 CORROSIVE ATMOSPHERE COATINGS

- A. 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.
- B. Corrosive atmospheres include the following locations:
 - 1. Exterior locations
 - 2. Food service/kitchen areas

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Size, apply and install supports and anchors in compliance with manufacturers recommendations.
- B. 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.
- C. Coordinate hanger and support installation to properly group piping of all trades.
- D. 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.
- E. 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.
- F. Perform welding in accordance with standards of the American Welding Society.

3.2 HANGER AND SUPPORT SPACING

- A. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
- B. Place a hanger within 12 inches of each horizontal elbow, valve, strainer, or similar piping specialty item.
- C. Use hangers with 1-1/2 inch minimum vertical adjustment.
- D. Support riser piping independently of connected horizontal piping.
- E. Greater hanger support distances may be used for CPVC and PEXa piping systems where metallic carrier channels are used in conformance with the manufacturer's recommendations and meet all code requirements.
- F. Adjust hangers to obtain the slope specified in the piping section of these specifications.
- G. 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"
Ductile Iron	All	10'-0"	20'-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"
Plastic (DWV)	1 1/2" and larger	4'-0"	10'-0"
Plastic	1" and smaller	32"	4'-0"
Plastic	1 1/4" and over	4'-0"	6'-0"

3.3 RISER CLAMPS

- A. 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.

3.4 CONCRETE INSERTS AND CONTINUOUS INSERT CHANNELS

- A. Select size based on the manufacturer's stated load capacity and weight of material that will be supported. Locate continuous insert channels on 6'-0" maximum centers and 2'-0" from corners. Furnish inserts to the General Contractor for placement in concrete formwork. Use inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inch size. Where concrete slabs form finished ceiling, provide inserts that are flush with the slab surface.

3.5 ANCHORS

- A. 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 between expansion loops. Make provisions for preset of anchors as required to accommodate both expansion and contraction of piping.

END OF SECTION 22 0529

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SECTION 22 07 00 - PLUMBING INSULATION

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: Unless noted otherwise, the Plumbing Contractor shall provide all labor and materials for a complete system in this specification section.

1.2 SECTION INCLUDES

- A. This section includes insulation specifications for plumbing piping and equipment.
 - 1. Insulation:
 - a. Rigid Fiberglass Insulation
 - b. Semi-Rigid Fiberglass Insulation
 - c. Fireproofing Insulation
 - 2. Covers and Jackets
 - 3. Insulation Inserts And Pipe Shields
 - 4. Accessories

1.3 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this section.
- B. Section 22 05 00 – Common Work Results for Plumbing
- C. Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment
- D. Section 22 11 00 – Facility Water Distribution
- E. Section 22 13 00 – Facility Sanitary Sewerage

1.4 SUBMITTALS

- A. Refer to Section 22 05 00 – Common Work Results for Plumbing, Submittals. In addition to the general content specified under Section 22 05 00 – Common Work Results for Plumbing, supply the following submittals:
 - 1. Insulation
 - a. Rigid Fiberglass Insulation
 - b. Semi-Rigid Fiberglass Insulation
 - c. Fireproofing Insulation
 - 2. Covers and Jackets
 - 3. Insulation Inserts And Pipe Shields
 - 4. Accessories
- B. 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.

1.5 REFERENCE STANDARDS

- A. ASTM B209 Aluminum and Aluminum Alloy Sheet and Plate
- B. ASTM C165 Test Method for Compressive Properties of Thermal Insulations
- C. ASTM C177 Heat Flux and Thermal Transmission Properties
- D. ASTM C195 Mineral Fiber Thermal Insulation Cement
- E. ASTM C240 Cellular Glass Insulation Block
- F. ASTM C302 Density of Preformed Pipe Insulation
- G. ASTM C303 Density of Preformed Block Insulation
- H. ASTM C449 Mineral Fiber Hydraulic Setting Thermal Insulation Cement
- I. ASTM C518 Heat Flux and Thermal Transmission Properties
- J. ASTM C533 Calcium Silicate Block and Pipe Thermal Insulation
- K. ASTM C534 Preformed Flexible Elastomeric Thermal Insulation
- L. ASTM C547 Mineral Fiber Preformed Pipe Insulation
- M. ASTM C552 Cellular Glass Block and Pipe Thermal Insulation
- N. ASTM C553 Mineral Fiber Blanket and Felt Insulation
- O. ASTM C578 Preformed, Block Type Cellular Polystyrene Thermal Insulation
- P. ASTM C591 Preformed Rigid Cellular Polyurethane Thermal Insulation
- Q. ASTM C610 Expanded Perlite Block and Thermal Pipe Insulation
- R. ASTM C612 Mineral Fiber Block and Board Thermal Insulation
- S. ASTM C921 Properties of Jacketing Materials for Thermal Insulation
- T. ASTM C1136 Flexible Low Permeance Vapor Retarders for Thermal Insulation
- U. ASTM E84 Surface Burning Characteristics of Building Materials
- V. MICA National Commercial & Industrial Insulation Standards
- W. NFPA 225 Surface Burning Characteristics of Building Materials
- X. UL 723 Surface Burning Characteristics of Building Materials

1.6 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Division 1.
- B. Label all insulating products delivered to the construction site with the manufacturer's name and description of materials.

1.7 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified in Section 22 05 00 – Common Work Results for Plumbing.

1.8 DESCRIPTION

- A. 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:
 - 1. Pipe Insulation
- B. Install all insulation in accordance with 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 Owner's Project Representative.

1.9 DEFINITIONS

- A. 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.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Materials or accessories containing asbestos will not be accepted.
- B. 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:
 - 1. 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.

2.2 INSULATION AND JACKETS

- A. Manufacturers: Armstrong, Certainteed, Manson, Childers, Dow, Extol, Halstead, H.B. Fuller, Imcoa, Knauf, Owens-Corning, Pittsburgh Corning, Rubatex, Johns-Mansville, Armacell, or approved equal.
- B. 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.
- C. Rigid Fiberglass Insulation:
 - 1. 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.
 - 2. 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.
- D. Semi-Rigid Fiberglass Insulation:
 - 1. 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.
2. 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.
- E. Fireproofing Insulation:
1. 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.
 2. Jacket material shall be the same as jacket for adjacent insulation.
- F. PVC Fitting Covers and Jackets:
1. White PVC film, gloss finish one side, semi-gloss other side, FS LP-535E, 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).
- G. Metal Jackets:
1. .016 inch thick pebble finish aluminum or .010 inch thick stainless steel with safety edge.

2.3 INSULATION INSERTS AND PIPE SHIELDS

- A. Manufacturers: B-Line, Pipe Shields, Value Engineered Products
- B. 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.
- C. 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.
- D. Precompressed 20# density molded fiberglass blocks, Hamfab, 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.
- E. Wood blocks will not be accepted.

2.4 ACCESSORIES

- A. 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.
- B. Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.

- C. 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.
- D. Tack fasteners to be stainless steel ring grooved shank tacks.
- E. Staples to be clinch style.
- F. Insulating cement to be ANSI/ASTM C195, hydraulic setting mineral wool.
- G. Finishing cement to be ASTM C449.
- H. Fibrous glass or canvas fabric reinforcing shall have a minimum untreated weight of 6 oz./sq. yd.
- I. Bedding compounds to be non-shrinking and permanently flexible.
- J. Vapor barrier coatings to be non-flammable, fire resistant, polymeric resin.
- K. Fungicidal water base coating (Foster 40-20) to be compatible with vapor barrier coating.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install insulation, jackets and accessories in accordance with manufacturer's instructions and under ambient temperatures and conditions recommended by manufacturer. Surfaces to be insulated must be clean and dry.
- B. 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.
- C. 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.
- D. Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.
- E. 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.
- F. Insulation shall be continuous through sleeves and openings. Vapor barriers shall be maintained continuous through all penetrations.
- G. Provide a complete vapor barrier for insulation on the following systems:
 - 1. Cold water (potable and non-potable)

3.2 PIPING, VALVE AND FITTING INSULATION

- A. General:
 - 1. 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.

2. 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.
3. 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.

B. Insulation Inserts and Pipe Shields:

1. 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.

C. Fittings and Valves:

1. 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.

D. Protective Jackets:

1. Provide a protective PVC jacket for the following insulated piping: Exposed in food handling/kitchen areas, wet areas, where insulation is subject to physical abuse, where insulated piping is exposed to public and lower than 10'-0" above finished floor, or where painted finish is required.
 - a. 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.
2. Provide a protective metal jacket for the following insulated piping: Exterior installations.
 - a. 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.
3. Provide a protective covering of 2 coats of indoor/outdoor vapor barrier mastic with fabric reinforcing for insulated piping where painted finish is required.

E. Pipe Insulation Schedule:

1. 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 Return	Rigid Fiberglass	1"	1"	1.5"		
Cold Water	Rigid Fiberglass	0.5"	0.5"	1"	1"	1"
Tempered Water	Rigid Fiberglass	0.5"	0.5"	1"		

2. The following piping and fittings are not to be insulated:
 - a. Chrome plated exposed supplies and stops (except where specifically noted).
 - b. Water hammer arrestors.
 - c. Piping unions and flanges for systems not requiring a vapor barrier.

3.3 INSULATION ON SOFTENER REQUIRED WHEN LOCATED IN HIGH TEMPERATURE/HUMIDITY AREAS SUBJECT TO CONDENSATION.

END OF SECTION 22 0700

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SECTION 22 11 00 - FACILITY WATER DISTRIBUTION

PART 1- GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: Unless noted otherwise, the Plumbing Contractor shall provide all labor and materials for a complete system in this specification section.

1.2 SECTION INCLUDES

- A. This section contains specifications for plumbing pipe and pipe fittings for this project.
 - 1. Domestic Water
 - 2. Dielectric Unions And Flanges
 - 3. Unions And Flanges
 - 4. Press Fitting Pipe Connections
 - 5. Mechanical Grooved Pipe Connections
 - 6. Piping System Leak Tests

1.3 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this section.
- B. Section 22 05 14 – Plumbing Specialties
- C. Section 22 05 15 – Piping Specialties
- D. Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

1.4 SUBMITTALS

- A. Refer to Section 22 05 00 – Common Work Results for Plumbing, Submittals. In addition to the general content specified under Section 22 05 00 – Common Work Results for Plumbing, supply the following submittals:
 - 1. Domestic Water
 - 2. Dielectric Unions And Flanges
 - 3. Unions And Flanges
 - 4. Press Fitting Pipe Connections
 - 5. Mechanical Grooved Pipe Connections
 - 6. Piping System Leak Tests
- B. Schedule from the contractor indicating the ASTM or AWWA 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.
- C. Statement from manufacturer on letterhead that pipe furnished meets the ASTM or AWWA specification contained in this section.

1.5 REFERENCE STANDARDS

- A. ANSI A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- B. ANSI A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- C. ANSI A21.51 Ductile-Iron Pipe, Centrifugally Cast

- D. ANSI B16.3 Malleable Iron Threaded Fittings
- E. ANSI B16.4 Cast Iron Threaded Fittings
- F. ANSI B16.5 Pipe Flanges and Flanged Fittings
- G. ANSI B16.22 Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings
- H. ANSI B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
- I. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
- J. ASTM A105 Forgings, Carbon Steel, for Piping Components
- K. ASTM A126 Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
- L. ASTM A234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- M. ASTM B32 Solder Metal
- N. ASTM B88 Seamless Copper Water Tube
- O. ASTM B280 Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
- P. ASTM B813 Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Alloy Tube
- Q. ASTM D1785 Poly Vinyl Chloride (PVC) Plastic Pipe
- R. ASTM D2241 Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
- S. ASTM D2464 Threaded Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 80
- T. ASTM D2466 Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
- U. ASTM D2564 Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings
- V. ASTM D2657 Heat Fusion Joining of Polyolefin Pipe and Fittings
- W. ASTM D2774 Recommended Practice for Underground Installation of Thermoplastic Pressure Piping
- X. ASTM D2855 Making Solvent Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings
- Y. ASTM D3139 Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
- Z. ASTM D3222 Unmodified Poly Vinylidene Fluoride (PVDF) Molding Extrusion and Coating Materials
- AA. ASTM D4101 Propylene Plastic Injection and Extrusion Materials
- BB. ASTM E84 Surface Burning Characteristics of Building Materials
- CC. ASTM F437 Threaded Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 80

- DD. ASTM F438 Socket Type Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe Fittings, Schedule 40
- EE. ASTM F441 Chlorinated Poly Vinyl Chloride (CPVC Plastic Pipe, Schedules 40 and 80
- FF. ASTM F493 Solvent Cements for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe and Fittings
- GG. ASTM F656 Primers for Use in Solvent Cement Joints of Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings
- HH. ASTM F876 Standard Specification for Crosslinked Polyethylene (PEX) Tubing
- II. ASTM F877 Standard Specification for Crosslinked Polyethylene (PEX) Plastic Hot- and Cold-Water Distribution Systems
- JJ. ASTM F1960 Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings
- KK. AWS A5.8 Brazing Filler Metal
- LL. AWWA C104 Cement Mortar Lining for Ductile Iron Pipe and Fittings for Water
- MM. AWWA C105 Polyethylene Encasement for Ductile Iron Piping for Water
- NN. AWWA C110 Ductile Iron and Gray Iron Fittings, 3 In. Through 48 In., for Water and Other Liquids
- OO. AWWA C111 Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fittings
- PP. AWWA C151 Ductile Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds for Water or Other Liquids
- QQ. AWWA C153 Ductile Iron Compact Fittings, 3 In. Through 48 In., for Water and Other Liquids
- RR. AWWA C600 Installation of Ductile Iron Water Mains and Their Appurtenances
- SS. AWWA C651 Disinfecting Water Mains
- TT. AWWA C900 Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In., for Water Distribution
- UU. AWWA C904 Standard for Crosslinked Polyethylene (PEX) Pressure Pipe, 1/2-inch Through 3-inch, for Water Service

1.6 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Division 1.
- B. Order all 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.
- C. Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the owner.

1.7 DESIGN CRITERIA

- A. Use only new material, free of defects, rust and scale, and meeting the latest revision of ASTM or AWWA specifications as listed in this specification.
- B. Construct all piping for the highest pressures and temperatures in the respective system.
- C. Non-metallic piping will be acceptable only for the services indicated. Non-metallic piping will be acceptable in ventilation plenum spaces, including plenum ceilings, when the installed system including insulation and support is certified in compliance with ASTM E84.
- D. 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.
- E. 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.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Promptly inspect shipments to ensure that the material is undamaged and complies with specifications.
- B. 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.
- C. Offsite storage agreements will not relieve the contractor from using proper storage techniques.
- D. Storage and protection methods must allow inspection to verify products.

PART 2 – PRODUCTS

2.1 DOMESTIC WATER

- A. Above Ground:
 - 1. 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. Press fitting pipe connections 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.

2.2 DIELECTRIC UNIONS AND FLANGES

- A. Manufacturers: Watts, Lochinvar, Wilkins or EPCO Sales, Inc.
- B. 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. Watts LF301.

2.3 UNIONS AND FLANGES

- A. 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.
- B. 2" and Smaller Copper:
 - 1. ANSI B16.18 cast bronze union coupling or ANSI B15.24 Class 150 cast bronze flanges.
- C. 2 ½" and Larger Copper:
 - 1. ANSI B15.24 Class 150 cast bronze flanges with full face Teflon gaskets.

2.4 PRESS FITTING PIPE CONNECTIONS

- A. Manufacturer: Viega, Victaulic, Apollo or approved manufacturer.
- B. All press fitting materials including o-rings, couplings, fittings and adapters shall be from the same manufacturer.
- C. Bronze press fittings for copper tubing shall conform to the material and sizing, requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM. Maximum operating pressure of 200 psi.

2.5 MECHANICAL GROOVED PIPE CONNECTIONS

- A. Manufacturers: Anvil, Grinnell, Star, Victaulic
- B. Mechanical grooved pipe couplings and fittings, ASTM F1476, may be used with cut groove galvanized steel pipe, cut groove ductile iron pipe or roll groove copper pipe where noted. Mechanical grooved components and assemblies to be rated for minimum 250 psi working pressure.
- C. All mechanical grooved pipe material including gaskets, couplings, fittings, and flange adapters shall be from the same manufacturer.
- D. Couplings shall be malleable iron, ASTM A47, or ductile iron ASTM A536 with painted finish. Reducing couplings are not acceptable.
- E. Fittings used on galvanized steel pipe shall be malleable iron, ASTM A47, or ductile iron A536, with galvanized finish, ASTM A153. Fittings used on ductile iron pipe to be cement mortar lined ductile iron with coal tar coating, ASTM A536; conforming to requirements of AWWA C110/C153 and AWWA C606. Fittings used on copper pipe shall be copper.
- F. Gaskets shall be EPDM, ASTM D2000. Gaskets for hot water systems to be flush seal design. Heat treated carbon steel oval neck track bolts and nuts, ASTM A183, with zinc electroplated finish ASTM B633.
- G. Flange adapters shall be ductile iron, ASTM A536; except at lug type butterfly valves where standard threaded flanges shall be used.
- H. 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.

PART 3 – EXECUTION

3.1 GENERAL

- A. Install pipe and fittings in accordance with reference standards, manufacturer's recommendations, and recognized industry practices.

3.2 PREPARATION

- A. 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.

3.3 ERECTION

- A. 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.
- B. Where copper or steel piping is embedded in masonry or concrete, provide protective sleeve covering of elastomeric pipe insulation.
- C. 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.
- D. Maintain piping in clean condition internally during construction.
- E. Provide clearance for installation of insulation, access to valves and piping specialties.
- F. Provide anchors, expansion joints, swing joints and/or expansion loops so that piping may expand and contract without damage to itself, equipment, or building.
- G. Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment.
- H. PEXa pipe joint connections shall be installed per manufacturer's recommendations. Use manufacturer recommended cold-expansion tool for ASTM F 1960 connections.
- I. Do not expose PEXa piping to direct sunlight. Provide cover to portions of piping exposed to direct sunlight.
- J. 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.

3.4 COPPER PIPE JOINTS+

- A. 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.

3.5 PRESS FITTING PIPE CONNECTIONS

- A. Press fitting connections shall be made in accordance with the manufacturer's installation instructions. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting. The fitting alignment shall be checked against the mark of the tubing to assure the tubing is fully engaged (inserted) in the fitting. The joints shall be pressed using the tool approved by the manufacturer.

3.6 MECHANICALLY FORMED TEE FITTINGS

- A. 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.

3.7 DOMESTIC WATER

- A. 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.
- B. Install interior water piping with drain valves where indicated and at low points of system to allow complete drainage. Install shutoff valves where indicated and at the base of risers to allow isolation of portions of system for repair. Do not install water piping within exterior walls.
- C. 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.
- D. 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.

3.8 DIELECTRIC UNIONS AND FLANGES

- A. Install dielectric unions or flanges at each point where a copper-to-steel pipe connection is required in domestic water systems.

3.9 UNIONS AND FLANGES

- A. 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.

3.10 PIPING SYSTEM LEAK TESTS

- A. 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.
- B. 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.
- C. For hydrostatic tests, use clean water and remove all air from the piping being tested. Measure and record test pressure at the high point in the system.
- D. Inspect system for leaks. Where leaks occur, repair the area with new materials and repeat the test. Caulking will not be acceptable.
- E. Entire test must be witnessed by the Owner's representative. All pressure tests are to be documented on form included in specification.

System	Test Medium	Initial Test		Final Test	
		Pressure	Duration	Pressure	Duration
Above Ground Domestic Water	Water	N/A		100 psig	8 hr.

END OF SECTION 22 1100

PIPING SYSTEM TEST REPORT

Date Submitted: _____

Project Name: _____

Location: _____ Project No: _____

Contractor: _____

Test Medium: Plumbing Fire Sprinkler
 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: _____

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SECTION 22 13 00 - FACILITY SANITARY SEWERAGE

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: Unless noted otherwise, the Plumbing Contractor shall provide all labor and materials for a complete system in this specification section.

1.2 SECTION INCLUDES

- A. This section contains specifications for plumbing pipe and pipe fittings for this project.
 - 1. Sanitary Waste And Vent
 - 2. Piping System Leak Tests

1.3 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this section.
- B. Section 22 05 14 – Plumbing Specialties
- C. Section 22 05 29 – Hangers and Supports for Plumbing Piping and Equipment

1.4 SUBMITTALS

- A. Refer to Section 22 05 00 – Common Work Results for Plumbing, Submittals. In addition to the general content specified under Section 22 05 00 – Common Work Results for Plumbing, supply the following submittals:
 - 1. Sanitary Waste And Vent
 - 2. Piping System Leak Tests
- B. 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.
- C. Statement from manufacturer on his letterhead that pipe furnished meets the ASTM, or CISPI specification contained in this section.

1.5 REFERENCE STANDARDS

- A. ANSI A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
- B. ANSI A21.11 Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
- C. ANSI A21.51 Ductile-Iron Pipe, Centrifugally Cast
- D. ANSI B16.3 Malleable Iron Threaded Fittings
- E. ANSI B16.4 Cast Iron Threaded Fittings
- F. ANSI B16.5 Pipe Flanges and Flanged Fittings
- G. ANSI B16.22 Wrought Copper and Wrought Copper Alloy Solder Joint Pressure Fittings

- H. ANSI B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
- I. ASTM A53 Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless
- J. ASTM A74 Cast Iron Soil Pipe and Fittings
- K. ASTM A105 Forgings, Carbon Steel, for Piping Components
- L. ASTM A126 Gray Cast Iron Castings for Valves, Flanges, and Pipe Fittings
- M. ASTM A234 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures
- N. ASTM A861 High Silicon Iron Pipe and Fittings
- O. ASTM A888 Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications
- P. ASTM B32 Solder Metal
- Q. ASTM B306 Copper Drainage Tube (DWV)
- R. ASTM B813 Liquid and Paste Fluxes for Soldering Applications of Copper and Copper Alloy Tube
- S. ASTM C76 Reinforced Concrete Culvert, Storm Drain and Sanitary Pipe
- T. ASTM C564 Standard Specifications for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
- U. ASTM C1540 Standard Specifications for Heavy Duty Shielded Couplings Joining Hubless Cast Iron Soil Pipe and Fittings
- V. ASTM D1785 Poly Vinyl Chloride (PVC) Plastic Pipe
- W. ASTM D2241 Poly Vinyl Chloride (PVC) Pressure-Rated Pipe (SDR Series)
- X. ASTM D2466 Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40
- Y. ASTM D2564 Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Pipe and Fittings
- Z. ASTM D2665 Poly Vinyl Chloride (PVC) Plastic Drain, Waste and Vent Pipe and Fittings
- AA. ASTM D2729 Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
- BB. ASTM D2855 Making Solvent Cemented Joints with Poly Vinyl Chloride (PVC) Pipe and Fittings
- CC. ASTM D3034 Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings
- DD. ASTM D3212 Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
- EE. ASTM D3311 Drain, Waste and Vent (DWV) Plastic Fitting Patterns
- FF. ASTM F2618 CPVC Pipe and Fittings for Chemical Waste Drainage
- GG. ASTM E84 Surface Burning Characteristics of Building Materials

- HH. CISPI 301 Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications
- II. 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

1.6 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Division 1.
- B. Order all 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.
- C. Any installed material not meeting the specification requirements must be replaced with material that meets these specifications without additional cost to the owner.

1.7 DESIGN CRITERIA

- A. 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.
- B. Construct all piping for the highest pressures and temperatures in the respective system.
- C. Non-metallic piping will be acceptable only for the services indicated. Non-metallic piping will be acceptable in ventilation plenum spaces, including plenum ceilings, when the installed system including insulation and support is certified in compliance with ASTM E84.
- D. 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.
- E. 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.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Promptly inspect shipments to ensure that the material is undamaged and complies with specifications.
- B. 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.
- C. Offsite storage agreements will not relieve the contractor from using proper storage techniques.
- D. Storage and protection methods must allow inspection to verify products.

PART 2 – PRODUCTS

2.1 SANITARY WASTE AND VENT

- A. Interior Above Ground:

1. Hubless cast iron soil pipe and fittings, ASTM A888, CISPI 301; with heavy-duty shielded stainless steel no-hub couplings, CISPI 310, ASTM C1540, ASTM C564, Anaco-Husky HD2000, Clamp-All Hi-Torq 125, Ideal Tridon HD Yellow. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute.
 - a. Manufacturers: A B & I Foundry, Charlotte Pipe and Foundry, Tyler Pipe
2. 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.
3. 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.
4. CPVC plastic pipe, Schedule 40, ASTM D1784, Class 23447 Type IV, with drainage pattern fittings per ASTM D3311, Solvent cement joints utilizing one step primerless cement as approved by the manufacturer. All fittings and pipe shall be tested and listed in accordance with CAN/ULC S102.2 and tested in general accordance with ASTM E-84/UL723 for flame spread of <25 and smoke development of <50. CPVC pipe and fittings shall be of Charlotte Chem Drain or Spears Lab Waste manufacturers, or equal.

B. Interior Below Ground:

1. Hubless cast iron soil pipe and fittings, ASTM A888, CISPI 301; with heavy-duty shielded stainless steel no-hub couplings, CISPI 310, ASTM C1540, ASTM C564, Anaco-Husky HD2000, Clamp-All Hi-Torq 125, Ideal Tridon HD Yellow. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute.
 - a. Manufacturers: A B & I Foundry, Charlotte Pipe and Foundry, Tyler Pipe.
2. Hub and spigot cast iron soil pipe and fittings, service weight, ASTM A74, with neoprene rubber compression gaskets, ASTM C564 and CISPI HSN 85. Pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute.
 - a. Manufacturers: A B & I Foundry, Charlotte Pipe and Foundry, Tyler Pipe
3. 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.
4. CPVC plastic pipe, Schedule 40, ASTM D1784, Class 23447 Type IV, with drainage pattern fittings per ASTM D3311, Solvent cement joints utilizing one step primerless cement as approved by the manufacturer. Fittings and pipe shall be tested and listed in accordance with CAN/ULC S102.2 and tested in general accordance with ASTM E-84/UL723 for flame spread of <25 and smoke development of <50. CPVC pipe and fittings shall be of Charlotte Chem Drain or Spears Lab Waste manufacturers, or equal.

PART 3 – EXECUTION

3.1 GENERAL

- A. Install pipe and fittings in accordance with reference standards, manufacturer's recommendations and recognized industry practices.

3.2 PREPARATION

- A. 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.

3.3 ERECTION

- A. 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.
- B. Where copper or steel piping is embedded in masonry or concrete, provide protective sleeve covering of elastomeric pipe insulation.
- C. 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.
- D. Maintain piping in clean condition internally during construction.
- E. Do not route piping through transformer vaults or above transformers, panelboards or switchboards, including the required service space for this equipment.
- F. 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.
- G. Install heavy-duty transition coupling when joining no-hub cast iron and PVC pipe, ASTM C1460 with ASTM C564 gasket, Husky SD4200 PVCxCI.

3.4 COPPER PIPE JOINTS

- A. Remove all slivers and burrs remaining from cutting operation by reaming and filing both pipe surfaces. Clean fitting and tube with metal brush, emery cloth or sandpaper. Remove residue from 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.

3.5 THREADED PIPE JOINTS

- A. Use a thread lubricant or Teflon tape when making joints; no hard setting pipe thread cement or caulking will be allowed.

3.6 SOLVENT WELDED PIPE JOINTS

- A. Install in accordance with 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.

- B. 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 bottom of 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 manufacturer's recommendations for initial set time before handling and for full curing time before pressure testing.
- C. Cold weather solvent/cement may be utilized only under unusual circumstances and when specifically approved by the Owner's Project Representative. Solvent welded pipe joints are not permitted to be made below 40 degrees.

3.7 MECHANICAL HUBLESS PIPE CONNECTIONS

- A. 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.

3.8 SANITARY WASTE AND VENT

- A. 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 4" and larger.
- B. 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.
- 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.

3.9 PIPING SYSTEM LEAK TESTS

- A. For hydrostatic tests, use clean water and remove all air from the piping being tested. Measure and record test pressure at the high point in the system.
- B. Inspect system for leaks. Where leaks occur, repair the area with new materials and repeat the test; caulking will not be acceptable.
- C. Entire test must be witnessed by the Owner's representative. All pressure tests are to be documented.

<u>System</u>	<u>Test Medium</u>	<u>Initial Test Pressure</u>	<u>Duration</u>	<u>Final Test Pressure</u>	<u>Duration</u>
Sanitary Waste and Vent	Water	N/A		10' water	2 hr.

END OF SECTION 22 1300

SECTION 22 42 00 - COMMERCIAL PLUMBING FIXTURES

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: Unless noted otherwise, the Plumbing Contractor shall provide all labor and materials for a complete system in this specification section.

1.2 SECTION INCLUDES

- A. This section includes specifications for plumbing fixtures, faucets and trim.
 - 1. Plumbing Fixtures
 - a. Lavatories
 - b. Water Closets

1.3 RELATED WORK

- A. Applicable provisions of Division 1 shall govern work under this section.
- B. Section 22 05 14 – Plumbing Specialties
- C. Section 22 11 00 – Facility Water Distribution
- D. Section 22 13 00 – Facility Sanitary Sewerage

1.4 SUBMITTALS

- A. Refer to Section 22 05 00 – Common Work Results for Plumbing, Submittals. In addition to the general content specified under Section 22 05 00 – Common Work Results for Plumbing, supply the following submittals:
 - 1. Lavatories
 - 2. Water Closets
- B. Include data concerning sizes, rough in-dimensions, capacities, materials of construction, trim, finishes, manufacturer's installation requirements, manufacturer's performance limitations, and appropriate identification.

1.5 REFERENCE STANDARDS

- A. ANSI A112.6.1M Supports for Off-the Floor Plumbing Fixtures for Public Use
- B. ANSI A112.18.1 Finished and Rough Brass Plumbing Fixture Fittings
- C. ANSI A112.19.1 Enameled Cast Iron Plumbing Fixtures
- D. ANSI A112.19.2M Vitreous China Plumbing Fixtures
- E. ANSI A112.19.5 Trim for Water Closet Bowls, Tanks and Urinals
- F. ARI-1010 Self-Contained Mechanically Refrigerated Drinking Water Coolers
- G. ASSE 1011 Hose Connection Vacuum Breakers

1.6 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Division 1.
- B. Plumbing products requiring approval by the State of Wisconsin Dept. of Safety & Professional Services must be approved or have pending approval at the time of shop drawing submission.

1.7 ENERGY EFFICIENCY REQUIREMENTS

- A. Plumbing fixtures must meet the following maximum water usage requirements:
 - 1. Lavatory Faucets, Public: flow of 0.5 gallons per minute, or 0.25 gallons per cycle
 - 2. Water Closets: 1.6 gallons per flush

PART 2 – PRODUCTS

2.1 PLUMBING FIXTURES

- A. 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. Architect to select from manufacturer's standard finish colors.
 - 1. Vitreous China and Enameled Cast Iron Fixtures: American Standard, Kohler, Sloan, Toto, Zurn
 - 2. Water Closet Seats: Bemis, Beneke, Centoco, Olsonite Sperzel
 - 3. Faucets: Chicago Faucet, American Standard, Sloan, Zurn
 - 4. Stops and Supplies: Chicago Faucet, McGuire, Zurn
 - 5. Flushometer Valves: Hydrotek, Delaney, Sloan, Zurn
 - 6. Drains and Traps: Kohler, McGuire, Dearborn, Zurn
 - 7. Carriers and Supports: Josam, J.R. Smith, Wade, Watts, Zurn
 - 8. Thermostatic Mixing Valves: Bradley, Lawler, Leonard, Powers
- B. Lavatories:
 - 1. L-1: Wall-hung vitreous china lavatory bowl, 21" x 18" bowl, with overflow, single faucet hole. Plug-in, sensor-operated faucet, polished chrome finish, gooseneck spout, 0.5 gpm laminar spray outlet, and thermostatic mixing valve with checkstops and wall mounting bracket. Provide concealed arm lavatory carrier.
 - a. Fixture: Kohler 'Kingston' K-2007-0
 - b. Faucet: Sloan SF-2200-4-PLG-TEE-CP-0.5GPM-MLM-IR-FCT
 - c. TMV: Watts LFUSG-B-M2
 - d. Drain: Kohler K-13885 strainer and 1¼" offset tailpiece
 - e. Trap: 1¼" x 1½" 17 gauge cast brass p-trap
 - f. Carrier: Zurn Z1231
 - g. Insulation Kit: See following 3.01 (E.) section for insulation kit information
- C. Water Closets:
 - 1. WC-1: Reinstall existing water closet bowl and flush valve removed to accommodate new wall finishes.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install plumbing fixtures in accordance with 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.
- B. Install each fixture with trap easily removable for servicing and cleaning. Install fixture stops in readily accessible location for servicing.
- C. Install barrier free fixtures in compliance with the Wisconsin Administrative Code and Federal ADA Accessibility Guidelines.
- D. Lavatory and sink p-traps may be installed with offset waste, with p-trap parallel and adjacent to wall. Supplies and stops are elevated to avoid contact by wheelchair users.
- E. Install flexible white molded-vinyl or PVC fixture waste and supply piping protection for all sinks and lavatories with exposed piping, Zurn Z8946-NT, TrueBro LavGuard2, or equal.
- F. Verify with Architectural elevations that water closet flushometer does not conflict with back-wall mounted grab bar.
- G. Water closet trip lever to be installed on wide side of accessible stall.
- H. 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.
- I. Cover pipe wall penetrations with escutcheons. Exposed traps, stops, piping and escutcheons to be chrome plated brass, unless otherwise indicated.
- J. Set floor mounted plumbing fixtures, counter mounted sinks, lavatory and sink faucets and drains with full setting bed of flexible non-staining plumber's putty.
- K. Seal wall mounted plumbing fixtures to wall with silicone sealant. Seal mop basins to floor and wall with grout or silicone sealant.
- L. Seal openings between walls, floors and fixtures with mildew-resistant silicone sealant same color as fixture.
- M. Adjust lavatory mixing valve outlet water temperature limit stops to maximum 105°F.
- N. Test fixtures to demonstrate proper operation. Replace malfunctioning units or components. Adjust flush valves for intended water flow rate to fixtures without splashing, noise or overflow. Adjust self-closing faucets to 15 second cycle.
- O. Protect fixtures during construction. At completion clean plumbing fixtures and trim using manufacturer's recommended cleaning methods and materials.

END OF SECTION 22 4200

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SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: Electrical Contractor provide: It is the intent of these specifications to provide complete and workable electrical systems as shown on the accompanying plans and as specified herein except such parts as are specifically exempted herein. Provide all necessary supervision, coordination, labor, materials, equipment, fixtures, dryage, hoisting, tools, transportation, plant services and facilities, machinery and connections to utilities for the installation of complete and operable electrical systems. If details or special conditions are required in addition to those shown on drawings, provide all material and equipment usually furnished with such systems or required to complete their installation, whether noted in plans and specification or not.
- B. Materials and labor shall be new (unless noted otherwise), first class and workmanlike and shall be subject at all times to the A/E's inspections, tests and approval from the commencement until the acceptance of the completed work.
- C. The layout shown on the drawings is necessarily diagrammatic but shall be followed as closely as other work will permit. The drawings provide design intent. The Contractor shall verify all dimensions at the site and be responsible for their accuracy.
- D. All sizes as given are minimum except as noted.
- E. Because of the scale of the Drawings, certain basic items, such as, pipe fittings, duct fittings, access panels, and sleeves, may not be shown. Where such items are required by Code or by other Sections, or where required for proper installation of the Work, such items shall be included, whether shown or not.
- F. In the event of any inconsistencies between the specifications, drawings, contract documents, applicable laws, statutes, ordinances, building codes, rules and regulations, the contractor shall provide the better quality or greater quantity of work and comply with or conform its work to the most stringent legal or contractual requirements.
- G. Changes from these drawings required to make this work conform to the building construction shall be made only with prior written approval of the Architect/Engineer. All proposed changes shall be shown on shop drawings. All measurements shall be verified by actual observation and all work shall fit in place meeting the approval of the Architect/Engineer.
- H. Equipment Specification may not deal individually with minute items required, such as, components, parts, controls, and devices which may be required to produce the equipment performance specified or as required to meet the equipment warranties. Where such items are required to make the system operational, they shall be included by the supplier of the equipment at no additional cost, whether or not specifically called for.

1.2 SECTION INCLUDES

- A. 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.

1. Submittals
2. Functional Performance Tests
3. Reference Standards
4. Quality Assurance
5. Guarantee
6. Work by Owner
7. Operation and Maintenance Instructions
8. Record Documents
9. Continuity of Existing Services
10. Protection of Finished Surfaces
11. Sealing and Firestopping
12. Regulatory Requirements
13. Certificates and Inspections
14. Coordination
15. Demolition and Existing Requirements
16. Request and Certification for Payment
17. Temporary Electrical Work
18. Approved Electrical Testing Laboratories
19. Sleeves and Openings
20. Omissions
21. Definitions
22. Project/Site Conditions
23. Work Sequence and Scheduling
24. Work by Other Trades
25. Salvage Materials
26. Access Panels and Doors
27. Identification
28. Demolition
29. Building Access
30. Equipment Access
31. Housekeeping and Clean Up

1.3 RELATED WORK

- A. Applicable provisions of Division 1 govern work under this section. [Drawings and general provisions of the Contract, including supplementary conditions apply to this Section.]
- B. The electrical work included in all other divisions is the responsibility of the contractor performing the Division 26 work unless noted otherwise.
- C. Section 01 91 13 – Commissioning Requirements
- D. Division 21 – Fire Suppression
- E. Division 22 – Plumbing
- F. Division 23 – Heating, Ventilating and Air Conditioning

1.4 SUBMITTALS

- A. Submit shop drawings for equipment under each section per requirements listed in that section, as well as per Division 1.
- B. 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. Do not submit hard copies of web pages. Failing to follow these instructions does not relieve the Contractor from the requirement of meeting the project schedule.

- C. On request from the A/E, the successful bidder shall furnish additional drawings, illustrations, catalog data, performance characteristics, etc.
- D. 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.
- E. The submittals must be approved before fabrication is authorized.
- F. Provide electronic copies of all submittals for review. Electronic submittals shall be sent to wi@henneman.com for review.

1.5 FUNCTIONAL PERFORMANCE TESTS

- A. Contractor is responsible for utilizing the functional performance test procedures supplied under these specifications in accordance with the procedures defined for functional performance test procedures in Section 01 91 13 – Commissioning Requirements.

1.6 REFERENCE STANDARDS

- A. Abbreviations of standards organizations referenced in this and other sections are as follows:

1. ANSI	American National Standards Institute
2. ASTM	American Society for Testing and Materials
3. EPA	Environmental Protection Agency
4. ETL	Electrical Testing Laboratories, Inc.
5. IEEE	Institute of Electrical and Electronics Engineers
6. IES	Illuminating Engineering Society
7. ISA	Instrument Society of America
8. NBS	National Bureau of Standards
9. NEC	National Electric Code
10. NEMA	National Electrical Manufacturers Association
11. NESC	National Electrical Safety Code
12. NFPA	National Fire Protection Association
13. UL	Underwriters Laboratories Inc.

1.7 QUALITY ASSURANCE

- A. Substitution of Materials: Refer to Division 1 for equals and substitutions.
 - 1. Where the following conflicts with Division 1, the requirements of Division 1 shall govern.
 - 2. If the Contractor wishes to submit an alternate to the named manufacturers for any equipment, he may submit a voluntary alternative minimum 7 days prior to bid, stating the manufacturer's name, model number, written, detailed product data.
 - 3. Where materials or equipment are specified by name the proposed material or equipment must be identical to the specified material or equipment in all characteristics of quality, function and serviceability, regardless of application in the Project and, in addition, when the Architect deems that aesthetic significance is important, the equal material or equipment must be identical in all characteristics of visual appearance, design, color and texture. Any proposed equal shall be submitted to Architect/Engineer for prior approval, which Architect/Engineer may approve or

disapprove in its sole discretion. Work performed or constructed with unapproved equals is at Contractor's risk and any required correction of work incorporating unapproved equals shall be at Contractor's sole cost and expense.

4. In all instances, Contractor shall assume full responsibility for proof of equality of the statute to the equipment hereinafter specified. All data and information necessary for proof of equality, function and space requirements shall be prepared and accompany the submittal of the substitution to the Architect/Engineer. Approval by the Architect/Engineer of equipment other than the specified does NOT relieve Contractor of this responsibility.
- B. 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.
- C. 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, including, but not limited to, coordination with other trades and any required changes by other trades and for obtaining the intended performance from the system into which these items are placed.
- D. 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 A/E, 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.

1.8 GUARANTEE

- A. Refer to Division 1 for Guarantees and Warranties. In addition to the requirements in Division 1, this Contractor shall meet the following requirements.
- B. In entering into a contract covering this work, the contractor accepts the specifications and guarantees that the work will be carried out in accordance with the requirements of this specification or such modifications as may be made under the contract documents.
- C. Contractor further guarantees that the workmanship and material will be of the best procurable and that none but experienced workmen familiar with each particular class of work will be employed.
- D. Contractor further guarantees to replace and make good at his own expense, including travel time, all defects, which may develop within 1 year after final payment and acceptance by the Architect/Engineer, due to faulty workmanship or material, upon, receipt of written notification from the Owner.

1.9 WORK BY OWNER

- A. PCB equipment (other than light fixture ballasts) removal and disposal, if required, will be by the Owner under separate contract.
- B. Electrical testing not described in these contract documents will be by the Owner under separate contract.

1.10 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Refer to Division 1 for all operations and maintenance instructions.

- B. In addition to the general content specified under Division 1 supply the following additional documentation:
 - 1. Manufacturer's wiring diagrams for electrically powered equipment.
 - 2. Copies of all approved submittals along with approval letters.

1.11 RECORD DOCUMENTS

- A. Refer to Division 1 for record documents.
- B. In addition to the general content specified under Division, follow the following procedures.
 - 1. During the progress of the work, Contractor shall maintain a current (daily) record set of the drawings and specifications, indicating thereon all work installed at variance with such Contract Documents including, without limitation, work covered by Addenda, Field Work Orders, Change Orders and Engineers additional instructions, interpretations and clarification. All changes or deviations from the original layout of the work and all critical dimensions of buried or concealed work shall be recorded. It shall be Contractor's responsibility to assure that said record sets are complete, accurate and up-to-date, Engineer shall have the right to inspect and review such record sets.
 - 2. At the completion of the work, Contractor shall indicated on record sets all record changes and such additional details necessary or appropriate to provide a complete reference document for use by Engineer. If variations and details cannot be shown clearly thereon, the Contractor shall prepare supplemental drawings adequate to impart the information. The foregoing drawings collectively shall constitute the "Record" drawings for the work.
 - 3. All indication on "Record" drawings shall be executed in a legible manner at Contractor's cost, using methods and legend presentations compatible with the overall scheme of the record drawings with respect to scale, drawing sheet sizes and sequential indexing. All changes shall be marked clearly in red and clouded.
 - 4. Engineer may review Contractor's "Record" drawings and notify Contractor of observed discrepancies or deviations. Contractor shall promptly correct discrepancies, deviations or illegible markups at Contractor's expense and resubmit revised drawings for Engineer review.
 - 5. Contractor shall provide final electronic record drawings to the Owner through the Engineer.
 - 6. Engineer will provide final electronic record drawings to the Owner based on Contractor's markups.

1.12 CONTINUITY OF EXISTING SERVICES

- A. 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.
- B. Each Contractor shall thoroughly familiarize himself with existing systems which will affect and be affected by relocation of existing equipment and installation of new lines and equipment. They shall plan installation of their work so that interruptions of services to any building or portion thereof will be a minimum and such interruptions shall occur only when system is not required, if possible. If not possible, each Contractor shall insure the operation of services by whatever means possible, such as, installing bypasses, capping of services or providing temporary service. Each interruption shall be for as short a duration as possible.

- C. No extra costs will be paid to the Contractor for such outages which must occur outside of regular weekly working hours.
- D. This Contractor shall restore any circuit interruption as a result of this work to proper operation as soon as possible. Note that institutional operations are on a seven day week schedule.

1.13 PROTECTION OF FINISHED SURFACES

- A. Refer to Division 1 for protection of finished services.
- B. 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" per Division 1.

1.14 SEALING AND FIRESTOPPING

- A. 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.
- B. Contractor shall request current life safety drawings from the Architect/Owner.

1.15 REGULATORY REQUIREMENTS

- A. 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, present manufacturing standards (including NEMA) and the Authority Having Jurisdiction (AHJ).
- B. All Division 26 work shall be done under the direction of a currently certified State of Wisconsin Certified Master Electrician.

1.16 CERTIFICATES AND INSPECTIONS

- A. Refer to Division 1 for permits, regulations, utilities and taxes.
- B. Obtain and pay for all required State or local installation inspections except those provided by the Architect/Engineer in accordance with State Code. Deliver originals of these certificates to the Owner. Include copies of the certificates in the Operating and Maintenance Instructions.
- C. Coordinate and provide inspections as required by the Authority Having Jurisdiction over the site.
- D. This contractor is responsible for coordination of Owner's electrical inspection. Inspection requirements will be issued at a pre-installation meeting, arranged by this contractor and the Owner's Electrical Inspector (See Article 15 of the General Conditions).

1.17 COORDINATION

- A. Refer to Division 1 for coordination. In addition to the requirements specified under Division 1, the following requirements apply.

- B. It shall be the responsibility of each Contractor to coordinate and consult with each other to determine space requirements and to determine that adequate space for servicing is provided for all equipment whether furnished by the Contractor or others. The General Contractor shall have final decision on all space priority conflicts among Contractors. All space priority conflicts shall be brought to the attention of the Architect/Engineer and Owner's Representative.
- C. Each Contractor shall thoroughly familiarize himself with existing systems which will affect and be affected by relocation of existing equipment and installation of new lines and equipment. They shall plan installation of their work so that interruptions of services to any building or portion thereof will be a minimum, and such interruptions shall occur only when system is not required, if possible. If not possible, each Contractor shall insure the operation of services by whatever means possible, such as, installing bypasses, or providing temporary service or circuits. Each interruption shall be for as short a duration as possible.
- D. Cooperation among all Contractors shall be required. Any Work that is installed without cooperating or coordinating with other Contractors and is in conflict shall be removed and reinstalled at that particular Contractor's cost. No cost additions to the Project will be considered due to a Contractor's lack of participation in the cooperation and coordination process. The following list of items of Work shall be the priority of order for all Contractors:
 - 1. Structure
 - 2. Recessed light fixtures
 - 3. Gravity-flow systems for sanitary, storm, steam and steam condensate piping
 - 4. Ductwork and appurtenances
 - 5. Electrical primary and secondary feeder conduits and low voltage cable tray
 - 6. Plumbing vent piping
 - 7. Fire protection (sprinkler system)
 - 8. HVAC piping
 - 9. Medical gas piping
 - 10. Gas piping, process piping and domestic water
 - 11. Electrical branch circuit conduit and low voltage conduit
 - 12. Control air lines or conduit
- E. The above list, in descending order, is the precedence assigned the Work items for space priority. Gravity-flow systems have first priority.
- F. Exception: Plumbing lines below or behind plumbing fixtures shall have precedence over all other work. Electrical conduit above or below switchgear, panelboards and control panels shall have precedence over all other work. Do not install any fluid conveying piping over electrical or elevator equipment.
- G. In the case of interconnection of the work of two or more contractors, verify at the site or on shop drawings all dimensions relating to such work. All errors due to the failure to so verify any such dimensions shall be promptly rectified.
- H. Any installed work that is not coordinated and interferes with another contractor's work shall be removed or relocated at the installing contractor's expense.
- I. Prior to start of Construction, the General Contractor shall schedule a meeting with all of the Contractors responsible for the work items listed above. The purpose of the meeting is to introduce the coordination program and to determine its implementation in relation to the progress schedule.
- J. At the initial Coordination Meeting, the Mechanical Contractor / Ventilating Contractor shall provide to the General Contractor outline drawings at 1/4" scale indicating column

centerlines, interior partition locations, and ceiling heights. The General Contractor shall verify all information shown on these drawings and relay any changes in the information to the Ventilation Contractor to be reflected on the Drawings. The Ventilating Contractor, with reference and consideration to the Structural, Heating, Electrical, Fire Protection, and Plumbing Drawings, shall draw to scale his proposed installation showing duct sizes, equipment layouts, and dimensions from column lines and from finished floors to bottom of ducts. Ductwork shall be maintained as tightly as possible to the underside of floor slabs and/or beams. For congested areas the Ventilating Contractor shall, in addition, prepare Drawings in section view. During this phase of the program, it shall be the Electrical Contractor's responsibility to furnish the Ventilating Contractor with recessed lighting installation and clearance requirements. This information shall be outlined on the Drawings by the Ventilating Contractor.

- K. The ductwork layouts shall be produced in sequence as mandated by the Project Schedule. The earliest area indicated in the Schedule shall receive the first effort, etc.
- L. When the Ductwork Drawings for the earliest scheduled area have been completed (time limitation as determined at the initial coordination meeting), the Ventilating Contractor shall provide the General Contractor with one set of drawings for each participant in the effort. The General Contractor will distribute the drawings to the participating Contractors for their use in drawing thereon the major components of their proposed installation using the general scheme shown on the Contract Drawings as a guide.
- M. The major components to be indicated include (but are not limited to) the following:
 - 1. Structure
 - 2. Roof drain leaders
 - 3. Above 3" waste piping
 - 4. Sprinkler mains
 - 5. Heating hot water mains
 - 6. Chilled water mains
 - 7. Conveying systems
 - 8. Significant primary and secondary feeder conduit runs
 - 9. Cable trays
 - 10. Contract ceiling heights
 - 11. Soffits
 - 12. Access points
 - 13. Fire wall penetrations
 - 14. Steam and condensate mains
 - 15. Gas, water, and process piping
- N. Information delineated shall be distance from column centerlines, pipe/equipment size, and distance from finished floor to bottom of pipe/equipment and hangers. Included on the Drawings shall be piping layout with hanger locations and hanger point loads. This information shall be developed satisfactorily enough to allow the Structural Engineer to verify the adequacy of the structural system for the projected loads. The hanger locations may have to be moved depending on the structural system review. No hanger shall be fabricated and/or installed until the hanger locations are reviewed and accepted by the Architect/Engineer.
- O. Within a period not to exceed two weeks after distribution of the drawings, the General Contractor will schedule a meeting with the Architect/Engineer and participating Contractors at which time areas of conflict shall be resolved. The drawings shall be overlaid to identify areas of conflict. All parties shall then cooperate in resolving the conflicts. Records of the agreements shall be entered on the Ventilating Contractor's drawings, acknowledged by all participants by signature in space provided for this purpose, and two copies distributed to all involved parties. All coordination drawing preparation and reproduction costs shall be

borne by the Ventilating Contractor. The above drawings, review, and coordination process shall be repeated until all areas on the Project have been coordinated.

- P. In the event a Contractor fails to cooperate in the Coordination Program, they shall be held responsible for all costs incurred for adjustments to the work of others made necessary to accommodate the uncooperative Contractor's installations.

1.18 DEMOLITION AND EXISTING REQUIREMENTS

- A. Existing active services: water, gas, medical gas, steam, ventilation, compressed or control air, sanitary waste, sanitary vent, storm electric, and any other building systems when encountered shall be protected against damage. Where existing services are to be abandoned, the services shall be removed back to the point of origin and removed from the site unless otherwise directed by the Owner's Representative.
- B. Submit a "Sequence of Work Schedule" in respect to all temporary and permanent utility and service cutovers after final determination. This schedule shall be submitted for approval to the Owner and Architect/Engineer. The submittal shall designate priority order, service or utility affected, date of cutover, and time of day to start and finish.
- C. Bidders should inspect the site to become familiar with conditions of the site which will affect the Work. Bidders should verify points of connection with utilities, routing of outside piping to include required clearances from any existing structures, or other obstacles.
- D. Extra payment will not be allowed for changes in the Work required because of the successful bidder's failure to make this inspection.

1.19 REQUEST AND CERTIFICATION FOR PAYMENT

- A. Within 10 days after Notice to Proceed, the successful bidder will submit to the Owner's Project representative in a form prescribed by Division 1, a cost breakdown of the proposed values for work performed which, if approved by the Owner's project representative, will become the basis for construction progress and monthly payments. The cost breakdown items shall reflect actual work progress stages as closely as feasible.
- B. In addition, if payment will be 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.

1.20 APPROVED ELECTRICAL TESTING LABORATORIES

- A. The following laboratories are approved for providing electrical product safety testing and listing services as required in these specifications:
 - 1. Underwriters Laboratories Inc.
 - 2. Electrical Testing Laboratories, Inc.

1.21 SLEEVES AND OPENINGS

- A. Openings required in new or existing construction that may be necessary for the installation of new work shall be provided by the respective contractor and all patching and repairing shall be done by workmen competent in the trade required, at the expense of the respective contractor. The respective contractor shall be responsible for arranging the work so that minimum cutting will be required. All rubbish and excess materials involved in such cutting shall be promptly removed from the site and disposed of by the contractor. Cutting through the floor or roof systems or load bearing walls shall be done only with the prior written approval of the Architect/Engineer so as to avoid damaging the structural system.

1.22 OMISSIONS

- A. No later than ten (10) days before bid opening, the Contractor shall call the attention of the A/E to any materials or apparatus the Contractor believes to be inadequate and to any necessary items of work omitted.

1.23 DEFINITIONS

- A. Wherever the words "the Contractor", "this Contractor" or "Electrical Contractor", appear in this section, they refer to the Contractor for Electrical Work.
- B. The term "provide" includes such labor, methods, materials, equipment and transportation or other facilities required to complete the Contract and the performance of all duties thereby upon the Contractor.

1.24 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.
- B. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of A/E before proceeding.
- C. Tools, materials and equipment shall be confined to areas designated by the Owner's project representative.

1.25 WORK SEQUENCE AND SCHEDULING

- A. Install work in phases to accommodate Owner's occupancy requirements. During the construction period coordinate schedule and operations with Owner's Construction Representatives.

1.26 WORK BY OTHER TRADES

- A. 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.
- B. 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.

1.27 SALVAGE MATERIALS

- A. 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.

1.28 IDENTIFICATION

- A. Refer to Electrical Section 26 05 53 – Identification for Electrical Systems.

1.29 SLEEVES AND OPENINGS

- A. General:

1. Pipe sleeves shall be constructed of standard weight ASTM A53 or ASME B36.10 steel with an anchor plate constructed of A36/A36M steel welded to the pipe. The sleeve shall be sized a minimum of 1" larger than piping insulation diameter. The entire assembly shall be hot-dip galvanized after fabrication.
2. Duct sleeves and piping sleeves passing through interior walls shall be constructed of 24 gauge galvanized steel minimum thickness.

B. Sleeves Through Below Grade Walls:

1. Provide steel pipe sleeve, ASTM A53, pressure sealing with membrane clamp ring, gasket, water stop ring, external rings, and nitrile rubber link seals. The assembly shall be hot-dip galvanized after fabrication.
 - a. Seals: Modular mechanical type seals, consisting of interlocking nitrile rubber links shaped to continuously fill the annular space between the pipe and the sleeve and electrically isolate the carrier pipe from the steel sleeve.
 - b. Sealing Element: Polychloroprene rubber material compounded to resist aging, ozone, sunlight, hydrocarbon gases, water, and chemical action.
 - c. Hardware: Type 300 series stainless steel fasteners. Threads rolled to produce smooth uniform threads and unbroken flow lines.
 - d. Compression Plates: Fiberglass-reinforced polyester plastic, injection molded for high physical properties, dielectric strength and non-cold flow creep characteristics, having high resistance to acidic and alkaline soils.
2. For sleeves located 15 feet or more below grade provide cast iron sleeve ASTM A74 with compression seals.

1.30 SEALING AND FIRESTOPPING

A. Fire and/or Smoke Rated Penetrations:

1. Manufacturers:
 - a. 3M, STI/SpecSeal, Tremco, Hilti
 - b. All firestopping systems shall be by the same manufacturer.
2. Submittals:
 - a. 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.
3. Product:
 - a. Firestop systems shall be UL listed or tested by an independent testing laboratory approved by the Owner and the Authority Having Jurisdiction (AHJ).

B. Non-Rated Penetrations:

1. Conduit and Cable Tray Penetrations:
 - a. 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 2 – EXECUTION

2.1 DEMOLITION

- A. 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.
- B. All devices, 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 owner 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.
- C. All contractors requiring the personnel/ material hoist and or temporary construction elevator (i.e. new elevators, temporarily protected) at times other than outlined in the temporary facilities specifications will make arrangements directly with the general contractor. The general contractor is responsible for all coordination and scheduling of the use of any hoisting equipment so the flow of the project is smoothly maintained and all workers have access to the work areas to perform their work and deliver material to the areas needed according to the project schedule.
- D. If any contractor's work requires the removal and replacement of any finished materials including but not limited to such materials as ceiling tiles, wall finishes, cabinets, doors, flooring, windows, etc. after those items are installed, each contractor will be responsible, at no additional cost to the owner, to replace any damaged, soiled or lost materials with new materials to match the existing materials and those materials damaged.

2.2 BUILDING ACCESS

- A. 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.

2.3 EQUIPMENT ACCESS

- A. 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.
- B. The approximate location of all equipment and devices is shown on the drawings. The Architect/Engineer reserves the right to change the location of all equipment or devices 6 feet in any direction at no additional cost provided such changes are requested before final installation.
- C. No piping carrying fluids shall be installed directly over electrical equipment.

2.4 COORDINATION

- A. The Contractor shall cooperate with other trades 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 Owner, provided such decision is reached prior to actual installation. The Contractor shall check location of electrical outlets with respect to other installations before installing.
- B. 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 installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls and other structural components as they are constructed.
- C. 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.
- D. Coordinate arrangements, mounting and support of electrical equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.
 - 4. So connecting raceways, cables, wireways, cable trays and busways will be clear of obstructions and of the working and access space of other equipment.
- E. Coordinate with Division 27 and 28 contractors and equipment vendors for proper location, quantity and capacity of all required conduits, back boxes, device rings and power supplies required to support systems specified.
- F. Cooperate with the testing consultant in ensuring Section 26 05 04 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.

2.5 SLEEVES AND OPENINGS

- A. General:
 - 1. Sleeves are not required for piping and ducts passing through interior non-rated drywall, plaster, or wood partitions and interior poured concrete walls that have been saw cut or core drilled.
 - 2. Pack annular space between sleeves and pipe or ducts with fiberglass insulation and seal.
 - 3. Piping sleeves that pass through fire rated floors, walls, or ceilings shall be provided with a UL listed fire stop material meeting UL 1479 to seal the opening between the pipe and the pipe sleeve to maintain the fire rating.
 - 4. Provide escutcheon plates on piping to cover sleeve and insulation in finished areas.
 - 5. Refer to Division 1, General Requirements for additional information on sleeves and openings.
- B. Sleeves Through Floors/Ceilings:
 - 1. Sleeves shall be installed to extend 1 inch above finished floor with a watertight sealant between floor and sleeve in all mechanical rooms and wet rooms listed below.

2. If a sleeve is not provided, provide 1-1/2 inch angle ring with urethane caulk between the angle and the floor and seal at the corners to form a watertight seal.
3. Wet Locations: Edit list for each project
 - a. Mechanical Rooms
 - b. Parking Ramps
 - c. Sanitary pumping stations
 - d. Swimming pool equipment rooms
 - e. Chemical storage and hazardous waste storage rooms
 - f. Food service/kitchen areas (behind/under equipment, cabinets, tables, etc.)

2.6 SEALING AND FIRESTOPPING

- A. The Contractor shall refer to building life safety drawings for all smoke and fire rates in addition to the mechanical drawings. Any discrepancies shall be brought to the attention of the Architect/Engineer before final addendum.
- B. Fire and/or Smoke Penetrations:
 1. Install approved product in accordance with the manufacturer's instructions where a pipe (i.e. cable tray, bus, cable bus, conduit, wireway, trough, etc.) penetrates a fire rated surface.
 2. 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.
- C. Non-Rated Surfaces:
 1. 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.
 2. 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.
 3. 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 with the manufacturer's instructions. Install so that the bolts used to tighten the seal are accessible from the interior of the building or vault.
 4. 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.

2.7 HOUSEKEEPING AND CLEAN UP

- A. 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 26 0500

SECTION 26 05 02 - ELECTRICAL DEMOLITION FOR REMODELING

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: The work under this section includes selective and/or total demolition of all existing electrical equipment, devices, conduit, wiring, back boxes and supporting associated devices for the electrical systems as noted on the O.R. wings.

1.2 SECTION INCLUDES

- A. Materials and Equipment

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work as specified in the individual Sections.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify field measurements and circuiting arrangements as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Verify whether or not PCB ballasts exist in light fixtures which will be disposed of. If PCB light fixture ballasts exist, then follow requirements in PCB BALLAST HANDLING AND DISPOSAL below.
- D. Demolition Drawings are based on casual field observation and/or existing record documents. Report discrepancies to the Owner, Architect/Engineer and Owner's Field Representative before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

3.2 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Coordinate utility service outages with the Owner, Owner's Field Representative, Architect, and Engineer. Also, if applicable, coordinate utility service outages with the local Utility Company.
- C. 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 Owner. This includes security and safety lighting.

- D. 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 Owner and Owner's 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.

3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

- A. Demolish and extend existing electrical work to meet all requirements of these specifications.
- B. If certain raceways and boxes are abandoned but not scheduled for removal, those items must be shown on the "As Built Drawings".
- C. Remove, relocate, and extend existing installations to accommodate new construction.
- D. Remove abandoned wiring to source of supply.
- E. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- F. 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.
- G. Disconnect and remove abandoned panelboards and distribution equipment.
- H. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- I. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- J. Repair adjacent existing construction and finishes damaged during demolition and extension work to match adjacent existing surfaces.
- K. Maintain access to existing electrical installations which remain active. Modify installation or provide access panel as appropriate.
- L. 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.

3.4 PCB BALLAST HANDLING AND DISPOSAL

- A. Generally, all high power factor fluorescent light ballasts manufactured before 1978 and some HID ballasts contain PCB compounds in their capacitors. The Contractor shall inspect all ballasts in all light fixtures and take the actions described below.
- B. All ballasts labeled as "NON-PCBs" or "NO PCBs" shall become the responsibility of the Contractor. If the PCB content is not stated on the ballast label, the ballast shall be handled as a PCB ballast.

- C. All PCB ballasts shall be removed from the light fixtures and shall have the wires clipped off. However, before removal, all PCB ballasts shall be carefully inspected for leaks. If a ballast appears to be leaking (evidenced by potting compound leaking out or by an oily film on the ballast surface) the ballast must be handled per EPA and DNR PCB regulations. Basically, this means the ballast is to be carefully removed from the fixture and placed in an approved drum. See paragraph below for the drum specifications. The person removing the ballast from the fixture shall wear protective gloves, eye protection, and protective clothing as necessary.
- D. If the fixture has also been contaminated, it must be cleaned to less than 10 micrograms/100 square centimeters contamination before disposal. This cleaning must be done by an approved PCB contractor and is not considered a part of this contract. Contact Owner for contractor approval before commencing with the cleanup.
- E. The ballasts shall then be placed in US DOT approved type 17C or type 17H drums (barrels) furnished by Veolia Environmental Services. The quantity and size of the drums will be determined by the contractor at the time of construction, - 30 and 55 gallon drums are typically available.
- F. These barrels shall be placed in storage with the cover that came with the barrels, in a location within a building, as designated by the Building Manager or Owner's project representative. The barrels are not to be placed outside where they are exposed to weather.
- G. THESE BALLASTS ARE NOT TO BE REMOVED FROM THE WORK SITE BY THE CONTRACTOR. To do so, would be a violation of DNR and DOT hazardous waste regulations and may result in a fine to the Contractor.
- H. The Contractor shall label and mark the PCB storage drums with EPA approved PCB labels and the storage area with signs, marks and lines to meet the regulations of Wisconsin Code NR 157.
- I. The Contractor shall also provide approved PCB absorbent materials to be stored immediately adjacent to the drum storage area. Do not place loose absorbent material in the drums.
- J. The Contractor shall provide to the Owner's Project representative, in written form, a total count of these ballasts (or their total weight by barrel) and where they are stored.
- K. See Lamp and Ballast Handling and Disposal instructions below.

3.5 LAMP AND BALLAST HANDLING AND DISPOSAL

- A. 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.
- B. The Contractor shall very carefully remove all lamps (fluorescent, incandescent, and HID) from light fixtures before removal of the fixture from its mounted position. This is to reduce the likelihood that the lamp(s) will be broken. If the Contractor breaks more than 1% of the total lamps removed for the project, the Contractor will be charged the cost difference between disposal of broken lamps and disposal of unbroken lamps for all lamps broken in excess of 1% of the total lamps removed in the project.

- C. The contractor shall contact Veolia Environmental Services (1-800-358-9095 or 262-243-8917) to coordinate the storage and pickup of disposed lamps and ballasts. The contractor shall obtain containers from Veolia Environmental Services, for the storage of lamps and ballasts. Removed lamps and ballasts shall be placed in containers by the contractor, marked with the number and type of lamp and ballast, and placed in storage at a location on the Owner's property. The contractor shall label the area as "Hazardous Material Storage – Mercury". The contractor shall make arrangements for pickup of the lamps and ballasts with Veolia Environmental Services, shall provide a count of all stored lamps and ballasts, and shall fill out any required forms.
- D. When making disposal arrangements with Veolia Environmental Services, the contractor shall notify them of the Owner's project name and number, and the Owner's project manager, for invoicing purposes. Invoicing from Veolia Environmental Services shall be sent to the Owner's project manager for direct charge payment from that project (lamp and ballast disposal costs to be paid by Owner).
- E. The contractor shall coordinate the lamp and ballast disposal with the Owner's field representative.

3.6 CLEANING AND REPAIR

- A. Clean and repair existing materials and equipment which remain or are to be reused.
- B. 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.
- C. 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.

3.7 INSTALLATION

- A. Install relocated materials and equipment under the provisions of other sections.

END OF SECTION 26 0502

SECTION 26 05 04 - CLEANING, INSPECTION, AND TESTING OF ELECTRICAL EQUIPMENT

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: 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. Additional testing may be required and specified in other Division 26 sections and shall also be provided.

1.2 SECTION INCLUDES

- A. General Inspection and Cleaning of All Electrical Equipment
- B. Grounding Systems
- C. Mechanical and Electrical Interlock System
- D. Ground Fault Systems
- E. Cables
- F. Panelboards
- G. Light Fixtures

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 26 05 00 – Common Work Results for Electrical

PART 2 – PRODUCTS

2.1 NOT USED.

PART 3 – EXECUTION

3.1 GENERAL INSPECTION AND CLEANING OF ALL ELECTRICAL EQUIPMENT

- A. Inspect for physical damage and abnormal mechanical and electrical conditions.
- B. Any item found to be out of tolerance, or in any other way defective as a result of the required testing, shall be reported to the A/E. Procedure for repair and/or replacement will be outlined. After appropriate corrective action is completed the item shall be re-tested.
- C. Compare equipment nameplate information with the latest single line diagram and report any discrepancies.
- D. Verify proper auxiliary device operation and indicators.
- E. Check tightness of accessible bolted electrical joints. Use torque wrench method.

- F. Make a close examination of equipment and remove any shipping brackets, insulation, packing, etc. that may not have been removed during original installation.
- G. 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.
- H. Clean All Equipment:
 - 1. Vacuum inside of panelboards, switchboards, switchgear, transformer core and coils, horizontal and vertical busducts, motor control centers (MCC)'s, fire alarm panels, comm/data, security panel, etc.
 - 2. Loosen attached particles and vacuum them away.
 - 3. Wipe all insulators with a clean, dry, lint free rag.
 - 4. Clean insulator grooves.
 - 5. Re-vacuum inside surfaces as directed by the Owner's Construction Representative or Inspector
- I. Inspect equipment anchorage.
- J. Inspect equipment and bus alignment.
- K. Check all overload elements for operation and control.
- L. Lubricate nonelectrical equipment per manufacturer's recommendations.

3.2 GROUNDING SYSTEMS

- A. Inspect the ground system for adequate termination at all devices.

3.3 MECHANICAL AND ELECTRICAL INTERLOCK SYSTEM

- A. Physically test each system to insure proper function, operation and sequencing.
- B. Closure attempt shall be made on locked open devices.
- C. Opening attempt shall be made on locked closed devices.
- D. Key exchange shall be made with devices operated in off normal positions.

3.4 GROUND FAULT SYSTEMS

- A. Inspect for physical damage.
- B. Ground fault device circuit nameplate identification shall be verified by device operation.

3.5 CABLES

- A. Visual and Mechanical Inspections:
 - 1. Inspect exposed sections for physical damage.
 - 2. Verify cable is supplied and connected in accordance with single line diagram.
 - 3. Inspect for shield grounding, cable support and termination.
 - 4. If cables are terminated through window type C.T.'s make an inspection to verify that neutrals and grounds are properly terminated for normal operation of protective devices.
 - 5. Inspect for visual jacket and insulation condition.
 - 6. Visible cable bends shall be checked against ICEA or manufacturer's minimum allowable bending radii -- 12 times the diameter for tape shielded cables.

7. Inspect for proper fireproofing in common cable areas.
8. There shall be NO tests performed on existing cable without specific direction from the Consulting Engineer.

B. Electrical Tests -- Below 600 Volts:

1. All secondary cables from the substation transformers to the secondary switchboards shall be subjected to insulation tests using a 500 vdc megger.
2. Visually inspect cables, lugs, connectors and all other components for physical damage and proper connections
3. Check all cable connectors for tightness (with a torque wrench) and clearances. Torque test conductor and bus terminations to manufacturer's recommendations.
4. Check for proper grounding resistance at all services and at transformers. Resistance shall be 2 ohms maximum.

3.6 PANELBOARDS

- A. 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.

3.7 LIGHT FIXTURES

- A. 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.

END OF SECTION 26 0504

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SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLE

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: The work under this section includes furnishing and installing required wiring and cabling systems including pulling, terminating and splicing.

1.2 SECTION INCLUDES

- A. General
- B. Manufacturers
- C. Building Wire
- D. Underground Wire For Exterior Work
- E. Wiring Connectors

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 01 91 13 – Commissioning Requirements
- C. Section 26 05 00 – Common Work Results for Electrical
- D. Section 26 05 26 – Grounding and Bonding for Electrical Systems
- E. Section 26 05 33 – Raceway and Boxes for Electrical Systems.
- F. Section 26 05 53 – Identification for Electrical Systems.

1.4 SUBMITTALS

- A. Submit product data: Provide for each cable assembly type.
- B. Submit factory test reports: Indicate procedures and values obtained.
- C. Submit shop drawings for modular wiring system including layout of distribution devices, branch circuit conduit and cables, circuiting arrangement, and outlet devices.
- D. Submit manufacturer's installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

1.5 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code
- B. IPCEA S-61-402/NEMA WC-5 Thermoplastic Insulated Wire and Cable
- C. IPCEA S-66-524/NEMA WC-7 Cross-linked Thermosetting Polyethylene-Insulated Wire and Cable

- D. UL 83
- E. ASTM

1.6 FUNCTIONAL PERFORMANCE TESTS

- A. Refer to Section 26 05 00 – Common Results for Electrical – Functional Performance Tests
- B. Acceptance tests shall be performed in accordance with the current version of ASNI/NETA ATS and by an independent testing agency. Specify only the independent testing agencies listed in the latest electrical Trades Preferred Manufacturers List.
- C. Tests shall be performed in accordance with applicable codes, standards, and equipment manufacturers' instructions.
- D. The Contractor shall provide all test equipment, materials and labor necessary to perform the tests, and shall coordinate with the other trades for necessary services, such as scaffolding and the uncoupling of motors.
- E. Tests shall consist of visual inspections, manual operations, and electrical testing under all normal and expected abnormal operating conditions.
- F. The A/E & Owner shall be notified a minimum of 3 working days in advance of all tests. Tests shall be witnessed by the owner unless such witnessing is waived in writing.
- G. The A/E & Owner shall be provided with a written test report, signed and dated, for all tests. Include a copy of the test report with O&M manual.
- H. Dielectric absorption tests shall be performed with a 2,500 volt DC megger.
- I. Megger tests shall be performed at a DC voltage of 1,000 volts for 600 volt rated equipment, and at a DC voltage of 500 volts for 120-200 volt rated equipment.
- J. A continuity check and a 1,000 volt DC megger test shall be performed on 600 volt power cables No. 4 AWG and larger. The megger test shall be performed between each pair of conductors and from each conductor to ground. Each test shall be performed for 15 seconds or until the insulation resistance value stabilizes.
- K. The insulation resistance between conductors, and from each conductor to ground, shall be 100 megohms minimum in one minute or less. In addition, the lowest insulation resistance value shall not differ from the highest value by more than 20 percent. If all megger readings for a given circuit are above 1000-megohms, the 20 percent balance requirement may be waived.

1.7 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Conductor sizes are based on copper.
- C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet project conditions.
- D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

PART 2 – PRODUCTS

2.1 GENERAL

- A. 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.
- B. All conductors shall be copper. [Confirm with Project Manager/Owner if aluminum conductors will be allowed for project. If so, provide aluminum feeder schedule on drawings and include remaining case spec. Otherwise, delete remaining paragraphs.]
- C. All cable and wire shall have 600 volts insulation, have a conductivity of 98 percent, and shall be annealed coated copper per ASTM B33 or B189.
- D. Wire sizes No. 12 AWG and smaller shall be solid wire, and wire No. 10 AWG and larger shall be stranded, Class B, ASTM B8.
- E. 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.
- F. Minimum wire sizes shall be as follows:
 - 1. Power wiring- #12 AWG
- G. All conductors shall be continuous without splices except at locations approved for the purpose.

2.2 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:
 - 1. Alcan Products Corporation; Alcan Cable Division
 - 2. American Insulated Wire Corp.; a Leviton Company
 - 3. General Cable Corporation
 - 4. Senator Wire & Cable Company
 - 5. Southwire Company
 - 6. Houston Wire & Cable
 - 7. AFC Cable Systems, Inc.
 - 8. Hubbell Power Systems, Inc.
 - 9. O-Z/Gedney; EGS Electrical Group, LLC
 - 10. 3M; Electrical Products Division
 - 11. Tyco Electronics Corp.

2.3 BUILDING WIRE

- A. Description: Single conductor insulated wire.
- B. Insulation: Type THHN/THWN, XHHW-2 insulation for feeders and branch circuits.
 - 1. Type XHHW-2 insulation for feeders with aluminum conductors.
 - a. Insulation shall not contain halogenated flame retardants, including but not limited to polybrominated diphenyl ethers.
 - b. Insulating jacket shall be 100% lead free.

2.4 METAL CLAD CABLE

- A. Type MC Cable may be used in IBC Business Group B occupancies or healthcare facilities non-emergency circuits for 15 and 20 ampere branch circuit wiring systems beyond the first outlet box.
- B. Provide metal clad cable (Type MC) that complies with UL Standard 1569 – Metal Clad Cables, the NEC and this section. Metal clad cable (Type MC) for healthcare facilities shall be listed for 2 grounding means and complies with NEC 517.13.
- C. Type MC cable shall consist of THHN insulated solid copper circuit conductors, an insulated solid copper equipment grounding conductor, a Mylar wrapping around the conductor bundle and a close fitting aluminum or galvanized steel outer sheath.
- D. Provide minimum 12 AWG conductors in Type MC cable.
 - 1. Provide larger conductor sizes as required to limit branch circuit voltage drop to 3 percent at the full connected load.
 - 2. Use larger conductor sizes to adjust allowable ampacity if there are more than 3 current carrying conductors in a cable.
 - 3. For isolated ground power circuits provide Type MC cable with a separate neutral conductor for each phase conductor; uniquely identify each neutral with a colored stripe on the white insulation corresponding to the phase conductor insulation color.
- E. Provide Type MC cable with the same conductor color coding as specified for BUILDING WIRE.
- F. Provide NRTL listed, insulated throat, snap-in steel box connectors for Type MC cable.

2.5 WIRING CONNECTORS

- A. Split Bolt Connectors: Not acceptable.
- B. Solderless Pressure Connectors: High copper alloy terminal. May be used only for cable termination to equipment pads or terminals. Not approved for splicing.
- C. 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.
- D. 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.
- E. Mechanical Connectors: Bolted type tin-plated; high conductivity copper alloy; spacer between conductors; beveled cable entrances.
- F. 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

3.1 GENERAL WIRING METHODS

- A. All wire and cable shall be installed in conduit.
- B. Do not use wire smaller than 12 AWG for power and lighting circuits.

- C. 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).
- D. Make conductor lengths for parallel conductors equal.
- E. Splice only in junction or outlet boxes.
- F. No conductor less than 10 AWG shall be installed in exterior underground conduit.
- G. Identify ALL low voltage, 600v and lower, wire per section 26 05 53.
- H. Neatly train and lace wiring inside boxes, equipment, and panelboards.

3.2 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use Listed wire pulling lubricant for pulling 4 AWG and larger wires and for other conditions when necessary.
- B. 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.
- C. Completely and thoroughly swab raceway system before installing conductors.
- D. 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.

3.3 METAL CLAD CABLE INSTALLATION

- A. Install Type MC cable according to NECA 120, Standard for installing and Maintaining Armored Cable (Type AC) and Metal Clad Cable (Type MC) (ANSI), the NEC and requirements in this Section.
- B. Route Type MC cable to meet project conditions.
- C. Use Type MC cable for 15- and 20-ampere branch circuit wiring beyond the first outlet or junction box; however, use conduit for the "homerun" from the first outlet or junction box to the branch circuit panelboard.
- D. Use Type MC cable in interior, dry locations that area classified by the International Building Code as "Business Group B" occupancy where they will be concealed above ceilings, in dry-wall partitions, in equipment enclosures or below raised floors. Type MC cable may be installed exposed in dedicated electrical rooms and mechanical rooms if they will not be exposed to physical damage or deteriorating agents.
- E. Install and support Type MC cable as required in Article 330 of the NEC. Use NRTL listed spring steel Type MC cable supports to support Type MC cable; do not use wire or plastic zip-ties to support Type MC cable.

3.4 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible junction boxes.
- B. 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.

- C. All splices shall be so made that they have an electrical resistance not in excess of two feet (600 mm) of the conductor.
- D. Use solderless spring type pressure connectors with insulating covers for wire splices and taps, 10 AWG and smaller.
- E. 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.
- F. Thoroughly clean wires before installing lugs and connectors.
- G. At all splices and terminations, leave tails long enough to cut splice out and completely re-splice.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 26 05 04.
- B. Additional testing as follows shall be performed if aluminum conductors are used:
- C. Equipment terminated with aluminum conductors shall be tested with a thermal imager and recorded.
- D. Conductors shall be closely checked for loose or poor connections, and for signs of overheating or corrosion.
- E. Test procedures shall meet NETA guidelines.
- F. Test results and report shall be provided to the engineer.
- G. Contractor shall correct all deficiencies reported in the test report.

3.6 WIRE COLOR

- A. General:
 - 1. For wire sizes 10 AWG and smaller - Wire shall be colored as indicated below.
 - 2. For wire sizes 8 AWG and larger – Use colored wire, or identify wire with colored tape at all terminals, splices and boxes. Colors to be as indicated below.
 - 3. In existing facilities, use existing color scheme.
 - 4. 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.
- B. 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.
- C. Branch Circuit Conductors: Three or four wire home runs shall have each phase uniquely color coded.
- D. Ground Conductors: Green for 6 AWG and smaller. For 4 AWG and larger, identify with green colored wire, or 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.

3.7 BRANCH CIRCUITS

- A. The use of single-phase, multi-wire branch circuits with a common neutral are not permitted. All branch circuits shall be furnished and installed with an individual accompanying neutral, sized the same as the phase conductors.

END OF SECTION 26 0519

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SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: The work under this section includes grounding electrodes, connectors, equipment grounding conductors, bus and bonding.

1.2 SECTION INCLUDES

- A. Manufacturers
- B. Mechanical Connectors
- C. Compression Connectors
- D. Exothermic Connections
- E. Wire

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 01 91 13– Commissioning Requirements
- C. Section 26 05 00 – Common Work Results for Electrical

1.4 SUBMITTALS

- A. Manufacturer's Instructions: Include instructions for preparation, installation and examination of exothermic connectors.

1.5 REFERENCE STANDARDS

- A. NFPA 70 - National Electrical Code.
- B. ANSI/IEEE 142 (Latest edition) - Recommended Practice for Grounding of Industrial and Commercial Power Systems.

1.6 FUNCTIONAL PERFORMANCE TESTING

- A. Refer to section 26 05 00- Common Work Results for Electrical- Functional Performance Testing.
- B. Tests shall be performed in accordance with applicable codes, standards, and equipment manufacturers' instructions.
- C. The Contractor shall provide all test equipment, materials, and labor necessary to perform the tests.
- D. Tests shall consist of visual inspections, manual operations, and electrical testing under all normal and expected abnormal operating conditions.

- E. The resistance to ground shall be measured using either the three point method or the fall-of-potential method.
- F. Grounding System Resistance: 2ohms maximum at building service entrance.
- G. Testing of grounding system resistance is to be witnessed by the electrical inspector or Field Representative. Provide test report of grounding system resistance in final O&M manuals.

1.7 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of grounding electrodes.

1.8 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.
- C. Comply with UL 467 for grounding and bonding materials and equipment.

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 by one of the following
 - 1. Burnoy
 - 2. Erico
 - 3. Schieder Sq. D
 - 4. Thomas Betts
 - 5. Panduit
 - 6. ILSCO.

2.2 MECHANICAL CONNECTORS

- A. The mechanical connector bodies shall be manufactured from high strength, high conductivity cast copper alloy material. Bolts, nuts, washers and lockwashers shall be made of Silicon Bronze and supplied as a part of the connector body and shall be of the two bolt type.
- B. 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.
- C. The connectors shall meet or exceed UL 467 and be clearly marked with the catalog number, conductor size and manufacturer.

2.3 COMPRESSION CONNECTORS

- A. The compression connectors shall be manufactured from pure wrought copper. The conductivity of this material shall be no less than 99% by IACS standards.

- B. Connectors shall meet or exceed performance requirements of IEEE 837, latest revision.
- C. The installation of the connectors shall be made with a compression, tool and die system, as recommended by the manufacturer of the connectors.
- D. The connectors shall be clearly marked with the manufacturer, catalog number, conductor size and the required compression tool settings.
- E. Each connector shall be factory filled with an oxide-inhibiting compound.

2.4 EXOTHERMIC CONNECTIONS

- A. As manufactured by Cadweld or similar.

2.5 WIRE

- A. Material: Stranded copper (aluminum not permitted).
- B. 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 on the same facility.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install Products in accordance with manufacturer's instructions.
- B. Mechanical connections shall be accessible for inspection and checking. No insulation shall be installed over mechanical ground connections.
- C. Ground connection surfaces shall be cleaned and all connections shall be made so that it is impossible to move them.
- D. Attach grounds permanently before permanent building service is energized.
- E. Conductor Termination and Connections:
 - 1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - 2. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
 - 3. Connections to Ground Rods at Test Wells: Bolted connectors.
 - 4. Connection to Structural Steel: Welded connectors.

3.2 LESS THAN 600 VOLT SYSTEM GROUNDING

- A. 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.

3.3 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

END OF SECTION 26 0526

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SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: The work under this section includes conduit and equipment supports, straps, clamps, steel channel, etc., and all required fastening hardware for supporting electrical work.

1.2 SECTION INCLUDES

- A. Support, Anchorage And Attachment Components
- B. Manufacturers

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 01 91 13 – Commissioning Requirements
- C. Section 26 05 00 – Common Work Results for Electrical
- D. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
- E. Section 26 05 26 – Grounding and Bonding for Electrical Systems
- F. Section 26 05 33 – Raceway and Boxes for Electrical Systems
- G. Section 26 24 16 – Panelboards
- H. Section 26 27 26 – Wiring Devices
- I. Section 26 51 13 -Interior Lighting Fixtures, Lamps and Ballasts

1.4 SUBMITTALS

- A. Product Data: Provide data for support channel and equipment supports.

1.5 QUALITY ASSURANCE

- A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.
- B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, “Structural Welding Code – Steel”.

1.6 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

- C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement and formwork requirements are specified in Division 03.
- B. Coordinate installation of roof curbs, equipment supports and roof penetrations as specified in Division 07 Section "Roof Accessories".

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE AND ATTACHMENT COMPONENTS

- A. Support Channel: Steel, Galvanized, Enameled or other corrosion resistant.
- B. Hardware: Corrosion resistant.
- C. Minimum sized threaded rod for supports shall be 3/8" for trapezes and single conduits 1-1/4" and larger, and 1/4" for single conduits 1" and smaller.
- D. 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.
- E. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
- F. Mechanical-Expansion Anchors: Insert-wedge-type, (zinc-coated) (stainless) steel, for use in hardened Portland cement concrete with tension, shear and pullout capacities appropriate for supported loads and building materials in which used.

2.2 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:
 - 1. Allied Tube & Conduit
 - 2. Cooper B-Line, Inc.; a Division of Cooper Industries
 - 3. ERICO International Corporation
 - 4. GS Metals Corp.
 - 5. Thomas & Betts Corporation
 - 6. Unistrut; Tyco International, Ltd.
 - 7. Wesanco, Inc.
 - 8. Fabco Plastics Wholesale Limited
 - 9. Seasafe, Inc.
 - 10. Empire Tool & Manufacturing Co.
 - 11. Hilti, Inc.
 - 12. ITW Ramset/Red Head; a Division of Illinois Tool Works, Inc.
 - 13. MKT Fastening, LLC
 - 14. Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit

PART 3 - EXECUTION

3.1 INSTALLATION

- A. 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).
- B. 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.
- C. Power-actuated fasteners and plastic wall anchors are not permitted.
- D. File and de-bur cut ends of support channel and spray paint with cold galvanized paint to prevent rusting.
- E. Do not fasten supports to piping, ductwork, mechanical equipment, cable tray or conduit. Do not fasten to suspended ceiling grid system.
- F. Do not drill structural steel members unless approved by Engineer.
- G. 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.
- H. In wet locations, mechanical rooms and electrical rooms install free-standing electrical equipment on 3.5 inch (89 mm) concrete pads.
- I. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
- J. 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.

3.2 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit and place miscellaneous metal supports accurately in location, alignment and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

3.3 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field painted surfaces.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).

- B. Touchup: Comply with requirements in Division 09 (painting sections) (Section "High Performance Coating") for cleaning and touchup painting of field welds, bolted connections and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections and abraded areas and apply galvanizing repair paint to comply with ASTM A 780.

END OF SECTION 26 0529

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SCOPE OF WORK

A. Base Bid:

1. The work under this section includes conduits, fittings, boxes, surface raceways, multi-outlet assemblies, auxiliary gutters, and wall duct for electrical systems including wall and ceiling outlet boxes, floor boxes, and junction boxes.

1.2 SECTION INCLUDES

- A. General
- B. Manufacturers
- C. Rigid Metal Conduit and Fittings
- D. Intermediate Metal Conduit (IMC) and Fittings
- E. Electrical Metallic Tubing (EMT) and Fittings
- F. Flexible Metal Conduit and Fittings
- G. Conduit Supports
- H. Outlet Boxes
- I. Pull and Junction Boxes

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Section 01 91 13 – Commissioning Requirements
- C. Section 26 05 00 – Common Work Results for Electrical
- D. Section 26 05 26 – Grounding and Bonding for Electrical Systems
- E. Section 26 05 29 – Hangers and Supports for Electrical Systems
- F. Section 26 27 26 – Wiring Devices

1.4 SUBMITTALS

- A. Surface Raceway System - submit product data and catalog sheets for all components.
- B. Boxes - provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.
- C. Product data for conduit, wireways, fittings, floor boxes, hinged-cover enclosures or cabinets.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

PART 2 – PRODUCTS

2.1 GENERAL

- A. All steel fittings and conduit bodies shall be galvanized.
- B. No cast metal, or split-gland type fittings permitted.
- C. Mogul-type condulets larger than 2 inch (50 mm) not permitted except as approved or detailed.
- D. All condulet covers must be fastened to the condulet body with screws and be of the same manufacture.
- E. Wireways, gutters and c-condulets shall not be used in lieu of pull boxes and condulets.
- F. All boxes shall be of sufficient size to provide free space for all conductors enclosed in the box and shall comply with NEC requirements.

2.2 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. AFC Cable Systems, Inc.
 - 2. Alflex Inc.
 - 3. Allied Tube & Conduit; a Tyco International Ltd. Co
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose
 - 5. Armorcast Products Company
 - 6. Arnco Corporation
 - 7. CANTEX inc
 - 8. Carson Industries LLC
 - 9. CDR Systems Corporation
 - 10. CertainTeed Corp.; Pipe & Plastics Group
 - 11. Christy Concrete Products
 - 12. Condux International, Inc
 - 13. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 14. EGS/Appleton Electric
 - 15. ElecSYS, Inc
 - 16. Electri-Flex Co.
 - 17. Erickson Electrical Equipment Company
 - 18. Hoffman
 - 19. Hubbell Incorporated; Killark Electric Manufacturing Co. Division
 - 20. Hubbell Incorporated; Quazite
 - 21. Lamson & Sessions; Carlon Electrical Products
 - 22. Manhattan/CDT/Cole-Flex
 - 23. Maverick Tube Corporation

24. NewBasis
25. Nordic Fiberglass, Inc.
26. O-Z Gedney; a unit of General Signal
27. RACO; a Hubbell Company
28. Robroy Industries, Inc.; Enclosure Division
29. Scott Fetzer Co.; Adalet Division
30. Spring City Electrical Manufacturing Company
31. Synertech Moulded Products, Inc.; a division of Oldcastle Precast
32. Thomas & Betts Corporation
33. Walker Systems, Inc.; Wiremold Company (The)
34. Wheatland Tube Company
35. Woodhead, Daniel Company; Woodhead Industries, Inc. Subsidiary

2.3 RIGID METAL CONDUIT AND FITTINGS

- A. Conduit: Heavy wall, galvanized steel, schedule 40, threaded. ANSI C80.1
- B. Fittings and Conduit Bodies: Use all steel threaded fittings and conduit bodies.

2.4 INTERMEDIATE METAL CONDUIT (IMC) AND FITTINGS

- A. Conduit: Galvanized steel, threaded. ANSI C80.6
- B. Fittings and Conduit Bodies: Use all steel threaded fittings and conduit bodies.

2.5 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS

- A. Conduit: Steel, galvanized tubing. ANSI C80.3
- B. Fittings: All steel, set screw, concrete tight. No push-on or indenter types permitted.
- C. Conduit Bodies: All steel threaded conduit bodies.

2.6 FLEXIBLE METAL CONDUIT AND FITTINGS

- A. Conduit: steel, galvanized, spiral strip.
- B. Fittings and Conduit Bodies: All steel, galvanized, or malleable iron (except as allowed in specification 26 51 13).

2.7 CONDUIT SUPPORTS

- A. See section 26 05 29.

2.8 OUTLET BOXES

- A. Sheet Metal Outlet Boxes and Device Boxes: galvanized steel, with stamped knockouts: NEMA 0S1.
- B. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 3/8 inch male fixture studs where required.
- C. Concrete Ceiling Boxes: Concrete type.
- D. Cast Boxes: Cast ferroalloy, or aluminum type deep type, gasketed cover, threaded hubs: NEMA FB1.
- E. Nonmetallic Outlet and Device Boxes: NEMA 0S2.

- F. Small Sheet Metal Pull and Junction Boxes: NEMA 0S1.

2.9 PULL AND JUNCTION BOXES

- A. 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).
- B. Sheet Metal Boxes: code gauge galvanized steel, screw covers, flanged and spot welded joints and corners.
- C. 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.
- D. Cast Metal Boxes for Outdoor and Wet Location Installations: Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as rain tight. Galvanized cast iron or aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
- E. Box extensions and adjacent boxes within 48" of each other are not allowed for the purpose of creating more wire capacity.
- F. Junction boxes 6" x 6" or larger size shall be without stamped knock-outs.
- G. Wireways shall not be used in lieu of junction boxes.

PART 3 – EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

- A. 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.
- B. Size power conductor raceways for conductor type installed. Conduit size shall be 1/2 inch (13 mm) minimum except all homerun conduits shall be 3/4", 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.
- C. 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.
- D. Arrange conduit to maintain headroom and present a neat appearance.
- E. Route exposed conduit and conduit above accessible ceilings parallel and perpendicular to walls and adjacent piping.
- F. 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.
- G. 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.

- H. 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.
- I. Do not fasten conduit with wire or perforated pipe straps. Before conductors are pulled, remove all wire used for temporary conduit support during construction.
- J. Support and fasten metal conduit at a maximum of 8 feet (2.4 m) on center.
- K. 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.
- L. 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.
- M. Changes in direction shall be made with symmetrical bends, cast steel boxes, stamped metal boxes or cast steel conduit bodies.
- N. For indoor conduits, no continuous conduit run shall exceed 100 feet (30 meters) without a junction box.
- O. All conduits installed in exposed areas shall be installed with a box offset before entering box.

3.2 CONDUIT INSTALLATION

- A. Cut conduit square; de-burr cut ends.
- B. Conduit shall not be fastened to the corrugated metal roof deck.
- C. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- D. 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.
- E. 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 26 05 26 – Grounding and Bonding for Electrical Systems for grounding bushing requirements.
- F. Install no more than the equivalent of three 90 degree bends between boxes.
- G. 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.
- H. Conduit shall be bent according to manufacturer's recommendations. Torches or open flame shall not be used to aid in bending of PVC conduit.
- I. Use suitable conduit caps or other approved seals to protect installed conduit against entrance of dirt and moisture.
- J. Provide 1/8 inch (3 mm) nylon pull string in empty conduit, except sleeves and nipples.

- K. 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.
- L. Avoid moisture traps where possible. Where moisture traps are unavoidable, provide junction boxes with drain fittings at conduit low points.
- M. 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.
- N. Route conduit through roof openings for piping and ductwork where possible.
- O. Conduit is not permitted in any slab topping of two inches (50 mm) or less.
- P. Ground and bond conduit under provisions of Section 26 05 26.
- Q. Identify conduit under provisions of Section 26 05 53.

3.3 CONDUIT INSTALLATION SCHEDULE

- A. Conduit other than that specified below for specific applications shall not be used.
- B. Concealed Dry Interior Locations: Rigid steel conduit. Intermediate metal conduit. Electrical metallic tubing.
- C. Exposed Dry Interior Locations: Rigid steel conduit. Intermediate metal conduit. Electrical metallic tubing.
- D. 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.

3.4 COORDINATION OF BOX LOCATIONS

- A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
- B. 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.
- C. No outlet, junction, or pull boxes shall be located where it will be obstructed by other equipment, piping, lockers, benches, counters, etc.
- D. Boxes shall not be fastened to the metal roof deck.
- E. 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.
- F. 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.

- G. 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.
- H. 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.
- I. Locate and install to maintain headroom and to present a neat appearance.
- J. Install boxes to preserve fire resistance rating of partitions and other elements, using approved materials and methods.

3.5 OUTLET BOX INSTALLATION

- A. 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.
- B. Power:
 - 1. 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.
- C. Provide knockout closures for unused openings.
- D. 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.
- E. 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.
- F. Install boxes in walls without damaging wall insulation.
- G. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- H. 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.
- I. In inaccessible ceiling areas, position outlets and junction boxes within 6 inches (150 mm) of recessed luminaire, to be accessible through luminaire ceiling opening.
- J. 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.
- K. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
- L. Provide cast ferroalloy or aluminum outlet boxes in exterior and wet locations.
- M. 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.

3.6 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings, in unfinished areas or furnish and install Owner approved access panels in non-accessible ceilings where boxes are installed. All boxes are to be readily-accessible.
- B. Support pull and junction boxes independent of conduit.

END OF SECTION 26 0533

SECTION 26 05 53 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: The work under this section includes the products and execution requirements relating to labeling of conduit, 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).

1.2 SECTION INCLUDES

- A. Manufacturers
- B. Identification Materials
- C. Power Raceway Identification Materials
- D. Armored and Metal-clad Cable Identification Materials
- E. Power and Control Cable Identification
- F. Conductor Identification Materials
- G. Cable Ties

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
- B. Section 01 91 13 – Commissioning Requirements
- C. Section 26 05 00 – Common Work Results for Electrical
- D. Section 26 05 19 – Low-Voltage Electrical Power Conductors and Cables
- E. Section 26 05 33 - Raceway and Boxes for Electrical Systems
- F. Section 26 24 16 – Panelboards
- G. Section 26 27 26 – Wiring Devices

1.4 SUBMITTALS

- A. Include product data for each electrical identification product indicated.

1.5 QUALITY ASSURANCE

- A. Comply with ANSI A13.1.
- B. Comply with NFPA 70.
- C. Comply with 29 CFS 1910.144 and 29 CFR 1910.145.

- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers shall comply with UL 969.

1.6 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

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:
 - 1. Pipe/conduit identification
 - a. Pipe maker by Briman Industries, Inc.
 - b. Seton
 - c. Brady
 - d. Emedco
 - e. Graphic Products
 - f. Panduit
 - g. Thomas & Betts
 - 2. Conductor & Warning Identification
 - a. 3M
 - b. Panduit
 - c. Thomas & Betts
 - d. Brady

2.2 IDENTIFICATION MATERIALS

- A. General:
 - 1. 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.
 - 2. 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.

3. Tape (phase identification only): Scotch #35 tape in appropriate colors for system voltage and phase.
4. 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.

2.3 POWER RACEWAY IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
- B. Colors for Raceways Carrying Circuits at 600 V or Less:
 1. Black letters on an orange field.
- C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistance coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Tape and Stencil for Raceways Carrying Circuits More than 600 V: 4-inch (100 mm) wide black stripes on 10-inch (250 mm) centers diagonally over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stop stripes at legends.
- G. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch (50 by 50 by 1.3 mm), with stamped legend, punched for use with self-locking cable tie fastener.

2.4 ARMORED AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Colors for Raceways Carrying Circuits at 600 V and Less.
 1. Black letters on an orange field.
 2. Legend: Indicate voltage.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches (50 mm) wide; compounded for outdoor use.

2.5 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Color coding shall be as noted in Section 26 05 19.

2.6 CONDUCTOR IDENTIFICATION MATERIALS

- A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide.
- B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- C. Snap-Around Labels: Slit, pretensioned, flexible, solid-colored acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identified and to stay in place by gripping action.
- D. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, 2 inches (50 mm) long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
- F. Color coding shall be as noted in Section 26 05 19.

2.7 CABLE TIES

- A. General –Purpose Cable Ties: Fungus insert, self-extinguishing, one-piece, self-locking, Type 6/6 nylon.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73° F (23° C), According to ASTM D638: 12,000 psi (82.7 MPa).
 - 3. Temperature Range: Minus 50 to plus 185° F. (Minus 50 to plus 85° C).
 - 4. Color: Black except where used for color-coding.
- B. Plenum-Rated Cable Ties: Self-extinguishing, UV stabilized, one-piece, self-locking.
 - 1. Minimum Width: 3/16 inch (5 mm).
 - 2. Tensile Strength at 73° F(23 ° C), According to ASTM D638: 7,000 psi (48.2 MPa)
 - 3. UL 94 Flame Rating: 94V-0.
 - 4. Temperature Range: Minus 50 to plus 284° F (Minus 46 to plus 140° C).
 - 5. Color: Black.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in Division 09 painting sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 – EXECUTION

3.1 GENERAL

- A. Identification legend, colors of labels and color of raceway shall match facility standards. When no standards established the following systems shall be used.
- B. 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.
- C. All branch circuit and power panels must be identified with the same identification legend used in circuit directory in main distribution center.
- D. Clean all surfaces before attaching labels with the label manufacturer's recommended cleaning agent.
- E. Install all labels firmly as recommended by the label manufacturer.
- F. Labels shall be installed plumb and neatly on all equipment.
- G. Embossed tape will not be permitted for any application.

3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing of finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
- F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- H. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:

1. In Spaces Handling Environmental Air: Plenum rated.

I. Painted Identification: Comply with requirements in Division 09 painting Sections for surface preparation and paint application.

3.3 IDENTIFICATION SCHEDULE

A. Accessible Raceway and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More than 30 A, and 120 V to ground: Install with self-adhesive vinyl tape applied in bands. Install labels at 10-foot (3-m).

B. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pullbox of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:

1. Power.

3.4 JUNCTION AND PULLBOX IDENTIFICATION

A. The following junction and pullboxes shall be identified utilizing spray painted covers:

<u>System</u>	<u>Color(s)</u>
Secondary Power – 480Y/277V	Brown
Secondary Power – 208Y/120V, 240/120V	White
Emergency Power – 480Y/277V	Brown/Red
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

B. 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.

3.5 POWER AND CONTROL WIRE IDENTIFICATION

A. 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.

B. 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.

3.6 WIRING DEVICE IDENTIFICATION

A. 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.

END OF SECTION 26 0553

SECTION 26 24 16 - PANELBOARDS

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: The work under this section includes main, distribution and branch circuit panelboards.

1.2 SECTION INCLUDES

- A. Main and Distribution Panelboards
- B. Branch Circuit Panelboards
- C. Elevator Power Module

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this section.
- B. Section 01 91 13 – Commissioning Requirements

1.4 SUBMITTALS

- A. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, and circuit breaker arrangement and sizes.

1.5 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

1.6 COORDINATION

- A. Existing electrical service interruption shall comply with Section 26 05 02 Electrical Demolition for Remodeling.
- B. Distribution panels and branch circuit panelboards manufacturer shall be the same manufacturer as switchboards, motor starters and disconnect switches.

PART 2 – PRODUCTS

2.1 BRANCH CIRCUIT PANELBOARDS

- A. Molded Case Circuit Breakers:
 - 1. Bolt-on type thermal magnetic trip circuit breakers.
 - 2. Provide UL Class A ground fault interrupter circuit breakers where shown on Drawings.
 - 3. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
 - 4. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250A and larger.

5. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 6. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long- and short-time time adjustments.
 - d. Ground-fault pickup level, time delay, and I^2t response.
 7. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 8. Accessories:
 - a. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
- B. Do not use tandem circuit breakers.
- C. Circuit breakers shall be bolt-on type with common trip handle for all poles. No handle ties of any sort will be permitted.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install a crimp type stud termination to stranded conductor when terminating on circuit breakers without a captive assembly rated for terminating stranded conductors.
- B. 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.

3.2 FIELD QUALITY CONTROL

- A. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections.

3.3 ADJUSTING

- A. Adjust all operating mechanisms for free mechanical movement.
- B. Adjust trip and time delay settings to values as recommended in coordination study provided by manufacturer or as instructed by the A/E. Include a copy of the coordination study and recommended circuit breaker set points in the O & M Manual.

END OF SECTION 26 2416

SECTION 26 27 26 - WIRING DEVICES

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: The work under this section includes wall switches, receptacles, occupancy sensors, wall dimmers, device plates and box covers, poke-through service fittings, access floor boxes, photo cells and time clocks.

1.2 SECTION INCLUDES

- A. Receptacles
- B. Device Plates and Box Covers

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section.
- B. Section 01 91 13 – Commissioning Requirements

1.4 SUBMITTALS

- A. Provide product data showing model numbers, configurations, finishes, dimensions, and manufacturer's instructions.
- B. Test Reports

1.5 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

PART 2 – PRODUCTS

2.1 RECEPTACLES

- A. Duplex Convenience and Straight-blade Receptacles: NEMA Type 5-20R, ivory nylon or high impact resistant face. Receptacles shall be UL498 Listed, comply with NEMA WD1, NEMA WD6 configuration 5-20R 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 90° connector, Cooper model 5362, or approved equal.
- B. Generally, all receptacles shall be duplex convenience type unless otherwise noted.
- C. 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.
- D. GFCI Receptacles: Duplex convenience straight-blade feed through receptacle, Specification Grade, with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A and include indicator light that is lighted when device is tripped. Device shall

comply with NEMA WD1, NEMA WD6, and UL standard 498. GFCI receptacles shall be Leviton model 8899, Hubbell model GRF5352, Pass & Seymour model 2095, Cooper model VGF20 or approved equal.

2.2 DEVICE PLATES AND BOX COVERS

- A. Decorative Cover Plate: Ivory smooth thermoplastic nylon. Plate securing screws shall be metal with color to match plate finish.
- B. While in Use Cover: UL Listed outdoor die-cast hinged cover with integral lock tab.
- C. Surface Cover Plate: Raised galvanized steel.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Install convenience receptacles 18 inches (450 mm) above floor, 6 inches (154 mm) above counters, grounding pole on bottom.
- B. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- C. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.
- D. Install devices and wall plates flush and level.
- E. 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.
- F. Oversized or extra deep coverplates not acceptable. Repair wall finishes and remount outlet box when standard device plates do not fit flush or do not cover rough wall opening.
- G. Coordination with Other Trades:
 - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including, painting, is complete.
- H. Conductors:
 - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NPFA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.

- b. Straighten conductors that remain and remove corrosion and foreign matter.
- c. Pigtailing existing conductors is permitted provided the outlet box is large enough.

I. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudg4e covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductors tightly clockwise, 2/3 to ¾ of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

3.2 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch and sensor with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. Test each receptacle device for proper polarity.
- E. Test each GFCI receptacle device for proper operation.
- F. The Engineer and Owner's personnel reserve the right to be present at all tests.

3.3 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. 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.

3.4 TESTING

- A. Perform tests and inspections and prepare test reports.
 1. Test Instruments: Use instruments that comply with UL 1436.
 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
- B. Tests for Convenience Receptacles:
 1. Line Voltage: Acceptable range is 105 to 132 V.
 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 5. Using the test plug, verify that the device and its outlet box are securely mounted.

6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 26 2726

SECTION 26 51 13 - INTERIOR LIGHTING FIXTURES, LAMPS, AND BALLASTS

PART 1 – GENERAL

1.1 SCOPE OF WORK

- A. Base Bid: The work under this section includes interior luminaires and accessories, exit signs, lamps, and ballasts.

1.2 SECTION INCLUDES

- A. Interior Luminaires and Accessories
- B. LED Luminaires
- C. LED Drivers

1.3 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this section.
- B. Section 01 91 13 – Commissioning Requirements

1.4 SUBMITTALS

- A. Include outline drawings, lamp and ballast data, support points, weights, accessory information and performance and photometric data for each luminaire type.
- B. 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.	

1.5 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficiency Lighting Products
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with NFPA 70.

1.6 WARRANTY

- A. Warranty Period: One year from date of Substantial Completion.

1.7 OPERATION AND MAINTENANCE DATA

- A. All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

1.8 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.9 EXTRA MATERIAL

- A. Provide three (3) percent of each fixture type, but not less than one (1) fixture of each type.

PART 2 – PRODUCTS

2.1 INTERIOR LUMINAIRES AND ACCESSORIES

- A. See the Luminaire Schedule on the drawings for type of luminaires and catalog numbers. Catalog numbers are shown on the drawings for quality and performance requirements only. Luminaires manufactured by others are equally acceptable provided they meet or exceed the performance of the indicated luminaires, and meet the intent of the design.
- B. Luminaire shall be listed by a NRTL (Nationally Recognized Testing Laboratory: e.g. UL, ETL, etc.).
- C. Provide luminaires with quick-connect disconnecting means, similar to Thomas & Betts Sta-Kon.
- D. Recessed fixtures shall comply with NEMA LE4 for ceiling compatibility for recessed fixtures.
- E. Sheet metal components shall be steel unless otherwise noted, formed and supported to prevent warping or sagging. Metal shall be free of burrs, sharp corners, and edges.
- F. Doors, Frames and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- G. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metallized Film: 90 percent.

2.2 LED LUMINAIRES

- A. LED Luminaires shall meet all DesignLights Consortium® (DesignLights.org) Product Qualification Criteria. This does not require that the luminaire be listed on the DesignLights Consortium's® Qualified Products List, but they must meet the Product Qualification Criteria. The technical requirements that the luminaire shall meet for each Application Category are:
 - 1. Minimum Light Output.
 - 2. Zonal Lumen Requirements.
 - 3. Minimum Luminaire Efficacy.
 - 4. Minimum CRI.

5. L70 Lumen Maintenance.
 6. Minimum Luminaire Warranty of 5 years (not pro-rated) to include LED driver and all LED components.
- B. Color Temperature of 3000K-4100K for interior luminaires as listed in the Luminaire Schedule on the plans. The color temperature of exterior LED luminaires should not exceed 4100K (nominal).
 - C. Color Consistency: LED manufacturer shall use a maximum 3-step MacAdam Ellipse binning process to achieve consistent luminaire-to-luminaire color for interior luminaires. Exterior luminaires shall use a maximum 5-step MacAdam Ellipse binning process.
 - D. Glare Control: Exterior luminaires shall meet DesignLights Consortium's® criteria for Zonal Lumen Distribution requirements or Backlight-Uplight-Glare (BUG) standards for exterior luminaires.
 - E. Luminaire shall be mercury-free, lead-free, and RoHS compliant.
 - F. Luminaire shall comply with FCC 47 CFR part 15 non-consumer RFI/EMI standards.
 - G. Light output of the LED system shall be measured using the absolute photometry method following IES LM-79 and IES LM-80 requirements and guidelines.
 - H. Luminaire shall maintain 70% lumen output (L70) for a minimum of 50,000 hours.
 - I. Lumen output shall not depreciate more than 20% after 10,000 hours of use.
 - J. Luminaire and driver shall be furnished from a single manufacturer to ensure compatibility.
 - K. Luminaire Color Rendering Index (CRI) shall be a minimum of 80 for interior luminaires, and a minimum of 70 for exterior luminaires.
 - L. LED luminaire shall be thermally designed as to not exceed the maximum junction temperature of the LED for the ambient temperature of the location the luminaire is to be installed. Rated case temperature shall be suitable for operation in the ambient temperatures typically found for the intended installation. Exterior luminaires to operate in ambient temperatures of -40°F to 104°F (-40°C to 40°C).
 - M. Luminaire shall operate normally for input voltage fluctuations of plus or minus 10 percent.
 - N. Luminaire shall have a maximum Total Harmonic Distortion (THD) of <20% at full input power and across specified voltage range.
 - O. All connections to luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
 - P. All luminaires shall be provided with knockouts for conduit connections.
 - Q. The LED luminaire shall carry a limited 5-year warranty minimum for LED light engine(s)/board array, and driver(s).
 - R. Provide all of the following data on submittals:
 1. Delivered lumens
 2. Input watts
 3. Efficacy
 4. Color rendering index.

- S. LED Luminaires used for Emergency Egress Lighting:
 - 1. The failure of one LED shall not affect the operation of the remaining LEDs.
- T. Emergency LED Luminaire Compatibility with Inverters:
 - 1. Emergency Inverters shall be sine-wave type, or have written confirmation from the luminaire manufacturer that the luminaire will function with a square-wave inverter.

2.3 LED DRIVERS

- A. General:
 - 1. Provide driver type (non-dimmed, step-dimmed, continuous-dimming, etc.) as indicated on the luminaire schedule on the drawings.
 - 2. Minimum Warranty of 5 years (not pro-rated) to include LED driver and all LED components.
 - 3. Driver shall have a rated life of 50,000 hours, minimum.
 - 4. Driver and LEDs shall be furnished from a single manufacturer to ensure compatibility.
 - 5. Driver shall have a minimum power factor (pf) of 0.9 and a maximum crest factor (cf) of 1.5 at full input power and across specified voltage range.
 - 6. Driver shall operate normally for input voltage fluctuations of plus or minus 10 percent.
 - 7. Driver shall have a maximum Total Harmonic Distortion (THD) of <20% at full input power and across specified voltage range.
 - 8. Wiring connections to LED drivers shall utilize polarized quick-disconnects for field maintenance.
 - 9. Fuse Protections: All luminaires shall have built-in fuse protection. All power supply outputs shall be either fuse protected or be Polymeric Positive Temperature Coefficient (PTC)-protected as per Class 2 UL listing.
 - 10. Provide all of the following data on submittals:
 - a. Input watts
 - b. Power Factor (pf)
 - c. Crest Factor (cf) at full input power
 - d. Total Harmonic Distortion (THD).
- B. Dimming Drivers:
 - 1. LED driver shall be compatible with dimming controls where dimming is indicated on the plans. Dimmable drivers shall use Dimming Constant Current (DCC), Constant Voltage, or Pulse Width Modulation (PWM) operation.
 - 2. Step-Dimming Drivers: Easily switched from 0% to 50% to 100% output power. Both switch-leg inputs shall control 50% of the luminaire's light output equally.
 - 3. Continuous Dimming Drivers: LED luminaires shall dim to (10%, 1%, or 0.1%) as specified in the Luminaire Schedule on the plans without visible flicker or "popcorn effect". "Popcorn effect" is defined as the luminaire being on a pre-set dimmed level (less than 100%), and going to 100% prior to returning to the pre-set level when power is returned to the luminaire. Continuous Dimming Drivers shall use 0-10V control.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Verify ceiling types with Architectural plans or with existing ceilings. Verify specified luminaires are compatible with specified ceiling type(s) prior to ordering luminaires.
- B. Install in accordance with manufacturer's instructions.

- C. Support luminaires larger than 2 x 4 foot (600 x 1 200 mm) size independent of ceiling framing.
- D. Provide independent support for all luminaires over 50 lbs.
- E. Locate ceiling luminaires as indicated on reflected ceiling plan.
- F. Install surface mounted luminaires and exit signs plumb and adjust to align with building lines and with each other. Secure to prohibit movement.
- G. 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.
- H. Install recessed luminaires to permit removal from below.
- I. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- J. Install code required hardware to secure recessed grid-supported luminaires in place.
- K. `specified lamps in each luminaire and exit sign.

3.2 ADJUSTING AND CLEANING

- A. Align luminaires and clean lenses and diffusers at completion of Work. Clean paint splatters, dirt, and debris from installed luminaires.
- B. Aim and adjust luminaires as indicated on Drawings or as directed by the A/E.
- C. Touch up luminaire finish at completion of work.

3.3 FIELD QUALITY CONTROL

- A. Operate each luminaire after installation and connection. Inspect for proper connection and operation.

3.4 LUMINAIRE CONNECTIONS

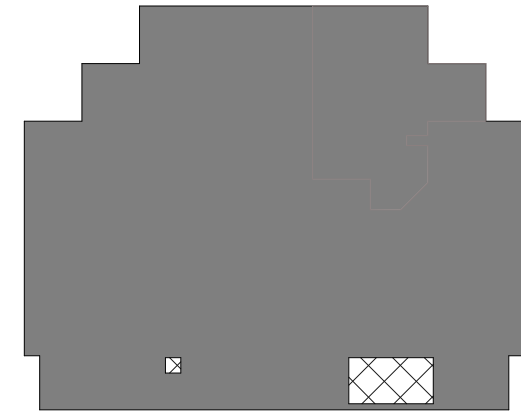
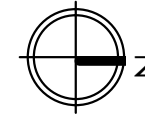
- A. Metal-clad (MC) cable whips: Metal-Clad (MC) type cable that combines power and Class 2 circuits into a single cable may be used for luminaire whips where 0-10V dimming control wiring is required. Whips may not exceed six (6) feet in length. Examples of such products are Encore Wire® MC-LED™ or Southwire® MC-PCS Duo™. Manufacturer's names and catalog numbers are used for quality and performance only. MC Cables manufactured by others shall be equally acceptable provided they meet or exceed in performance and quality as specified.
 - 1. Recessed, including Master-Satellite connections:
 - a. Use a luminaire fixture whip from a J-box for recessed lay-in luminaires. Luminaire fixture whips shall be aluminum or steel AC Cable (Armored Cable) or Flexible Metal Conduit (FMC). Metal Clad (MC) cable that combines power and Class 2 circuits (for 0-10V dimming control) into a single cable may be used as a whip for luminaires that are dimmed.
 - b. Cable/Conduit whips shall be 3/8" (10 mm) minimum diameter, six feet (1.8 m) maximum length.
 - c. Flexible whips or pre-wired systems between master and satellite luminaires may be supported by the ceiling grid wires.

- d. The flexible connectors shall be steel, galvanized, clamp type with locknut, snap-in type with locknut, or snap-in connector type, including those used on the master-satellite units.
2. Surface Mounted (finished spaces):
- a. Provide direct conduit and box connection. Use surface metal raceway where indicated on drawings. Conceal box and conduit where appropriate. Flexible metal conduit shall not be used where the conduit is exposed.

END OF SECTION 26 5113

MUSKEGO PUBLIC LIBRARY BATHROOM REMODEL

**S73 W16663 W JANESVILLE ROAD
MUSKEGO, WI 53150**



KEY PLAN

SHEET INDEX

GENERAL

- T1 BATHROOM REMODEL TITLE SHEET
- AG1.1 CODE INFORMATION

ARCHITECTURAL

- AD1.1 DEMO FLOOR PLAN
- A1.1 MAIN FLOOR PLAN
- A7.1 INTERIOR ELEVATIONS
- A8.1 REFLECTED CEILING PLAN

PLUMBING

- P0.0 PLUMBING GENERAL INFORMATION
- PD1.1 MAIN FLOOR PLUMBING DEMOLITION PLAN
- P1.1 MAIN FLOOR PLUMBING NEW WORK PLAN
- P4.1 PLUMBING DETAILS

MECHANICAL

- M1.1 MAIN FLOOR MECHANICAL BALANCING PLAN

ELECTRICAL

- E0.0 ELECTRICAL GENERAL INFORMATION
- E0.1 ELECTRICAL SYMBOLS
- ED1.1 MAIN FLOOR ELECTRICAL DEMOLITION PLAN
- ED2.1 MAIN FLOOR LIGHTING DEMOLITION PLAN
- E1.1 MAIN FLOOR ELECTRICAL NEW WORK PLAN
- E2.1 MAIN FLOOR LIGHTING NEW WORK PLAN
- E6.0 ELECTRICAL SCHEDULES

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Sheet Title
BATHROOM REMODEL TITLE SHEET

Project Title
MUSKEGO PUBLIC LIBRARY
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FAMILY BATHROOM REMODEL

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MUSKEGO, WI 53150

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Date Revised:

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Sheet

T1

CODE INFORMATION

CODE USED: 2009 INTERNATIONAL BUILDING CODE (IBC) AS EDITED BY THE WISCONSIN ADMINISTRATIVE CODE
 2009 INTERNATIONAL FIRE CODE (IFC)
 CURRENT NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) STANDARDS AS REFERENCED BY THE INTERNATIONAL FIRE CODE
 2009 UNIFORM PLUMBING CODE (UPC)
 USING 2009 IPC TABLE 403.1
 2009 INTERNATIONAL MECHANICAL CODE (IMC)
 NFPA 54, NATIONAL FUEL GAS CODE, 2009 EDITION;
 THE PROVISIONS OF 661—CHAPTER 226;
 AND THE STATE PLUMBING CODE
 2011 NATIONAL ELECTRIC CODE (NFPA 70)
 2009 INTERNATIONAL ENERGY CONSERVATION CODE (IECC)
 2009 INTERNATIONAL EXISTING BUILDING CODE (IEBC)
 2010 AMERICAN WITH DISABILITIES ACT (ADA)

BUILDING GROSS AREA: MAIN LEVEL = 38,573 SQ.FT.
 MEZZANINE = 1,600 SQ.FT.
 TOTAL BUILDING = 40,173 SQ.FT.
 MODIFIED BUILDING AREA= 70 SQ.FT.

OCCUPANCY: A-3: LIBRARY

OCCUPANCY LOAD: 0 (IN MODIFIED AREA)

CONSTRUCTION TYPE: TYPE II-A PER 1998 BUILDING CODE

ALLOWABLE AREA: NO BUILDING AREA ADDED AS PART OF THIS RENOVATION.

FIRE SPRINKLER SYSTEM: EXISTING AUTOMATIC SPRINKLER DESIGNED TO NFPA-13 AND FIRE ALARM

REQUIRED RATINGS: NONE

EXISTING BUILDING CODE PROVISIONS: LEVEL 1 ALTERATION NEW WORK TO MEET 2009 IBC



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Sheet Title
CODE INFORMATION

Project Title MUSKEGO PUBLIC LIBRARY
**MUSKEGO PUBLIC LIBRARY
 FAMILY BATHROOM REMODEL**
 S73W16663 JANESVILLE
 MUSKEGO, WI 53150

Date Issued: 25 MAY 2023
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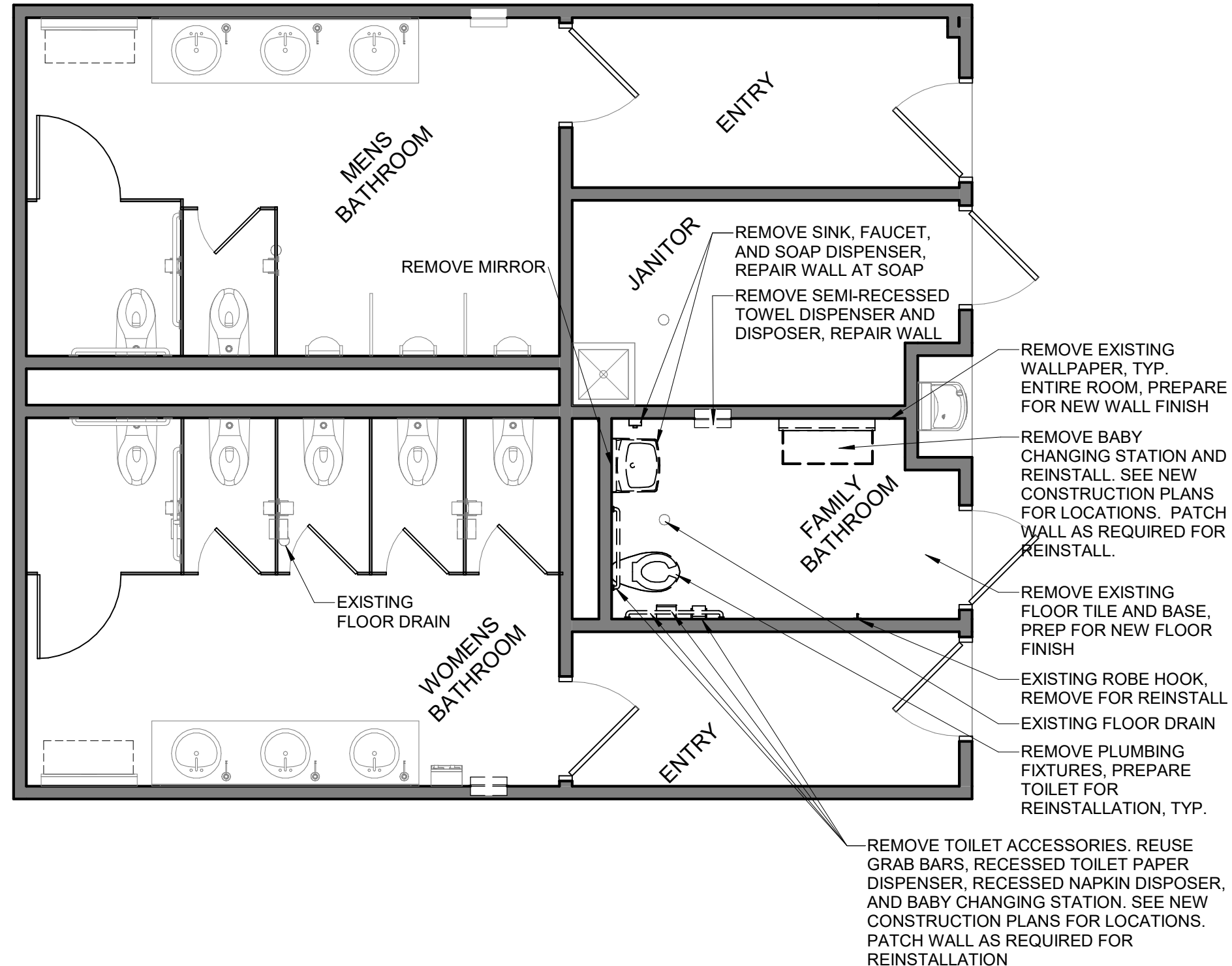
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AG1.1

ARCHITECTURAL DEMOLITION NOTES

1. THE CONTRACTOR SHALL EXAMINE SITE AND PORTIONS THEREOF TO ASCERTAIN AND CHECK ALL EXISTING CONDITIONS AND DIMENSIONS WHICH MAY AFFECT THE CONTRACTOR'S WORK. NO ALLOWANCE SHALL SUBSEQUENTLY BE MADE IN THE CONTRACTOR'S BEHALF FOR ANY EXPENSE TO WHICH THE CONTRACTOR MAY PAY DUE TO FAILURE OR NEGLIGENCE ON ONE'S PART TO MAKE AN EXAMINATION. ANY CONFLICTS OR OMISSIONS, ETC. SHALL BE REPORTED TO THE ARCHITECT PRIOR TO BID SUBMISSION.
2. PROVIDE PLASTIC SHEETS (OR OTHER) FOR SAFETY AND PROTECTION FROM NOISE, DUST, ETC. OF OCCUPIED AREAS DURING CONSTRUCTION AND DEMOLITION. PROVIDE RATED SEPARATION WHERE REQUIRED.
3. REMOVE PORTIONS OF EXISTING CONSTRUCTION AS NOTED ON THE DRAWINGS AND AS NECESSARY TO ACCOMMODATE THE NEW CONSTRUCTION AND REPLACE OR REPAIR AS NEEDED.
4. CONTRACTOR NOTE: SOME ANCILLARY/MINOR DEMOLITION AND PATCH/REPAIR MAY NOT BE SHOWN SPECIFICALLY. CONTRACTOR SHALL PROVIDE AND COORDINATE ALL ANCILLARY/MINOR WORK REQUIRED TO COMPLETE NEW WORK AS DESIGNED. VERIFY CONDITIONS WITH OWNER'S REPRESENTATIVE PRIOR TO BEGINNING WORK.
5. THE CONTRACTOR IS CAUTIONED THAT THIS PROJECT INVOLVES ALTERATION TO EXISTING FACILITIES. WORK WHICH IS REQUIRED TO BE PERFORMED TO PROVIDE A COMPLETELY OPERABLE INSTALLATION WITHIN THE SCOPE OF THE WORK, BUT WHICH IS NOT SPECIFICALLY INCLUDED ON THE PLANS, SHALL BE PERFORMED AS PART OF THE CONTRACT AND INCLUDED IN THE BID.
6. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT AND CONSTRUCTION REPRESENTATIVE IMMEDIATELY OF ANY UTILITIES NOT IDENTIFIED FOUND IN CONSTRUCTION TO BE REMOVED.
7. ANY ITEMS DESCRIBED IN THESE DRAWINGS WITHOUT A "NEW" (N) OR "EXISTING" (E) DESIGNATION SHALL BE CONSIDERED NEW.
8. EXISTING BUILDING DIMENSIONS AS SHOWN ON THE PLANS MAY DIFFER PLUS OR MINUS; FIELD VERIFY.
9. WHERE INDICATED ON THE PLANS, ALIGN NEW WALLS WITH THE FACE OF EXISTING WALLS, COLUMNS AND FURRING FOR A FLUSH CONDITION. REPAIR, PATCH AND FINISH EXISTING WALLS WHICH ABUTS NEW WALLS.
10. PREPARE SURFACES TO RECEIVE FINISHES. PATCH ALL EXISTING WORK ALTERED BY NEW WORK. ALL NEW AND PATCHED SURFACES SHALL BE SMOOTH, CONTINUOUSLY FREE OF IMPERFECTIONS AND IN PROPER CONDITION TO RECEIVE THE FINISH PER THE PROJECT MANUAL. IN PATCHED AREAS OR ANY AREA WHERE A FINISH IS NOT IDENTIFIED, THE AREA SHALL MATCH ADJACENT MATERIAL IN CONSTRUCTION, COLOR, TEXTURE, AND MANUFACTURE. ANY EXISTING WORK, I.E. FLOOR TILES, WALL TILES, ETC. WHICH ARE DAMAGED OR STAINED, ETC. SHALL BE REPAIRED OR REPLACED AS NECESSARY WITH NEW MATCHING MATERIAL.
11. FASTENER ATTACHMENTS ONTO EXISTING CONCRETE SURFACES: DO NOT DAMAGE EXISTING EMBEDDED REINFORCEMENT BARS. LOCATE EXISTING REINFORCEMENT BARS WITH A PACHOMETER PRIOR TO INSTALLING FASTENERS TO AVOID DAMAGING EXISTING REINFORCING BARS.
12. THE EXISTING OCCUPANTS INTEND TO OCCUPY THE BUILDING AND MAINTAIN OPERATIONS, INCLUDING USING THE BATHROOMS ADJACENT TO THIS PROJECT. SUBMIT A DEMOLITION PLAN INDICATING PROCEDURES AND OPERATIONAL SEQUENCING FOR REVIEW AND ACCEPTANCE BY THE OWNER AND ARCHITECT.



1 DEMO FLOOR PLAN - BATHROOM REMODEL
SCALE: 1/4" = 1'-0"



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Sheet Title
DEMO FLOOR PLAN

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FAMILY BATHROOM REMODEL

S73W16663 JANESVILLE
MUSKEGO, WI 53150

Date Issued: 25 MAY 2023
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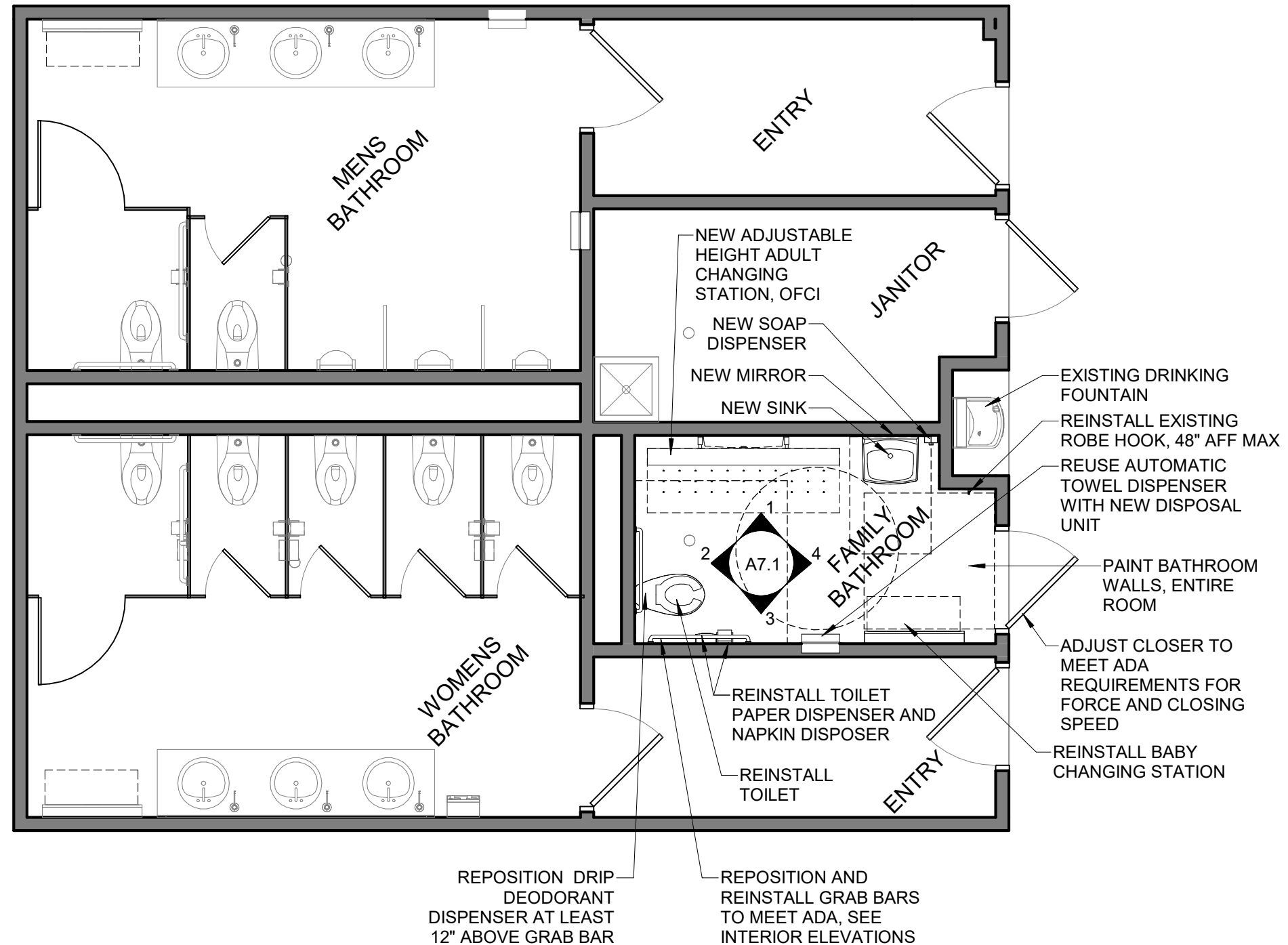
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AD1.1

ARCHITECTURAL GENERAL NOTES

1. THESE CONSTRUCTION DRAWING SHEETS ARE TO BE READ IN CONJUNCTION WITH THE PROJECT MANUAL.
2. WHEN DRAWINGS AND PROJECT MANUAL CONFLICT, BIDDER SHALL REQUEST WRITTEN CLARIFICATION FROM THE ARCHITECT PRIOR TO BIDDING. IF CLARIFICATION IS NOT OBTAINED PRIOR TO BIDDING, THE FOLLOWING SHALL BE USED TO DETERMINE SCOPE OF BID: MATERIAL SIZE AND QUANTITY SHALL BE DETERMINED BY DRAWINGS, QUALITY IS DETERMINED BY PROJECT MANUAL. FINAL DETERMINATION SHALL BE BY THE ARCHITECT OR ENGINEER PRIOR TO CONSTRUCTION OR FABRICATION.
3. ERRORS ARE TO BE REPORTED IMMEDIATELY TO THE ARCHITECT.
4. THE CONTRACTOR SHALL ARRANGE FOR THE PREMISES TO BE MAINTAINED IN AN ORDERLY MANNER THROUGHOUT THE COURSE OF THE JOB. MAINTAIN CLEANLINESS THROUGHOUT - DO NOT BLOCK EXITS, ENTRANCES, LOBBIES, CORRIDORS, ETC. PROTECT AREA FROM DAMAGE WHICH MAY OCCUR FROM DEMOLITION DUST, WATER, ETC. PROVIDE AND MAINTAIN TEMPORARY BARRICADES, CLOSURE WALLS, ETC. AS REQUIRED TO PROTECT THE PUBLIC DURING THE PERIOD OF CONSTRUCTION. DAMAGE OF EXISTING STRUCTURES AND EQUIPMENT SHALL BE REPAIRED OR REPLACED TO THE SATISFACTION OF THE OWNER AT THE EXPENSE OF THE CONTRACTOR.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVING ALL LEFTOVER MATERIALS, DEBRIS, TOOLS, AND EQUIPMENT INVOLVED AT THE CONCLUSION OF THE INSTALLATION. THE CONTRACTOR SHALL LEAVE ALL AREAS CLEAN. ALL FIXTURES AND REUSABLE MATERIALS TO BE REMOVED ARE TO BE STORED OR DISPOSED OF AS PER OWNERS INSTRUCTIONS.
6. CONTRACTOR SHALL TAKE PRECAUTIONS TO PREVENT WORKERS FROM INJURY OR EXPOSURE TO DANGEROUS MATERIALS DURING THE WORK BY THE CONTRACTOR, AS PER OSHA REGULATIONS AND FIRE-WATCH AS PER THE SUPPLEMENTAL CONDITIONS IN THE PROJECT MANUAL.
7. DO NOT SCALE DRAWINGS. NOTIFY ARCHITECT / ENGINEER IF ADDITIONAL DIMENSIONS ARE REQUIRED OR DISCREPANCIES DISCOVERED.
8. ALL EXISTING FACILITY DIMENSIONS ARE TO BE VERIFIED ON SITE.
9. CONTRACTOR TO VERIFY EXISTING CONDITIONS AND DIMENSIONS PRIOR TO SHOP DRAWING APPROVAL AND CONSTRUCTION. SEE PROJECT MANUAL WHERE FIELD VERIFICATION CANNOT BE OBTAINED PRIOR TO SHOP DRAWING APPROVAL.
10. DIMENSIONS ARE ACTUAL. DIMENSIONS FOR STUD WALL IS TO FACE OF FINISH WALL, NOT CENTER OF STUD.
11. SEE TYPICAL MOUNTING HEIGHTS FOR EQUIPMENT AND FIXTURES ON SHEET A7.1.
12. FOR ADDITIONAL PLAN INFORMATION REFER TO PARTIAL ENLARGED PLANS OR DETAILS AS NOTED ON THE DRAWINGS.
13. REFER TO PLUMBING, MECHANICAL, AND ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION.
14. FOR OFCI ADULT CHANGING STATION, CONTRACTOR TO INSTALL BLOCKING IN THE WALL TO SUPPORT THE STATION, AS RECOMMENDED BY THE MANUFACTURER (APPROX. 48-INCH HEIGHT BY 30-INCH WIDTH BEHIND THE SURFACE-MOUNTED HEIGHT-ADJUSTABLE COMPONENT).
15. FOR DOOR CLOSER ADJUSTMENT, 5 LBS MAX OPENING FORCE AND 5 SECOND MIN. CLOSING SPEED REQUIRED.



1 MAIN FLOOR PLAN - BATHROOM REMODEL
SCALE: 1/4" = 1'-0"



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Sheet Title
MAIN FLOOR PLAN

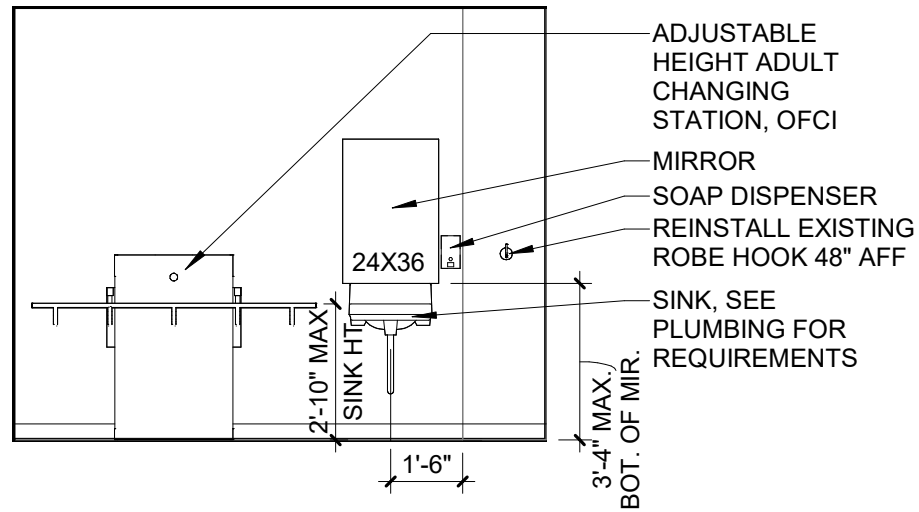
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MUSKEGO PUBLIC LIBRARY
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FAMILY BATHROOM REMODEL
S73W16663 JANESVILLE
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Date Revised:

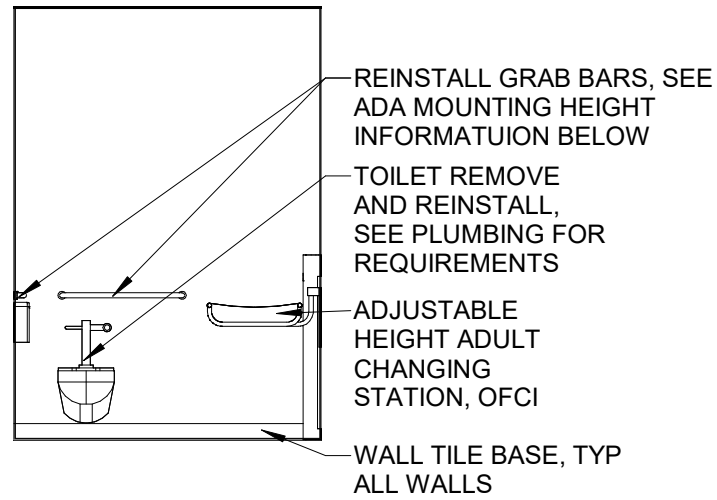
Project Number
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Sheet

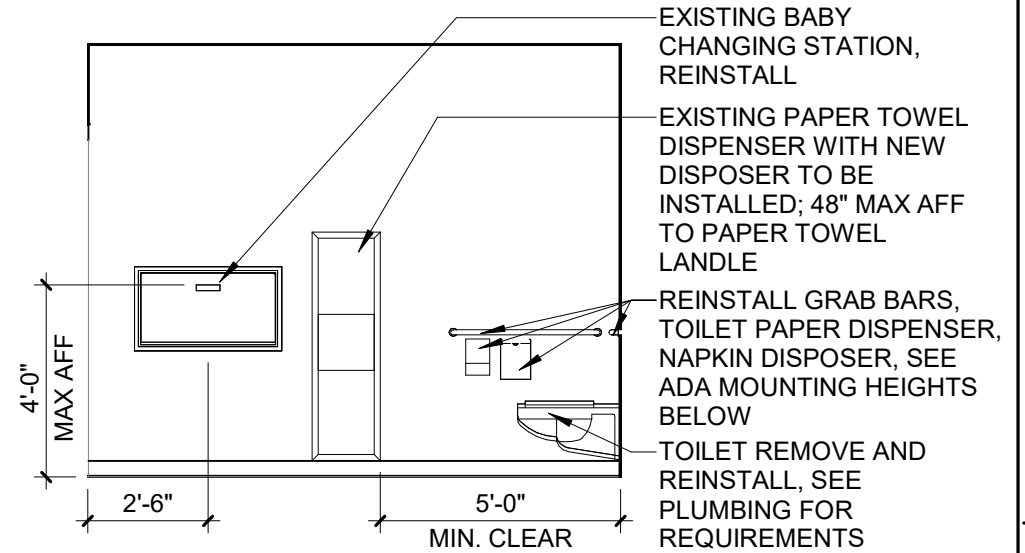
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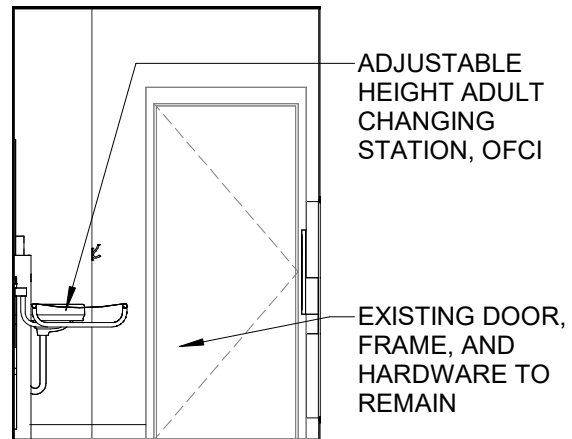
1 FAMILY BATHROOM NORTH
ELEVATION
SCALE: 1/4" = 1'-0"



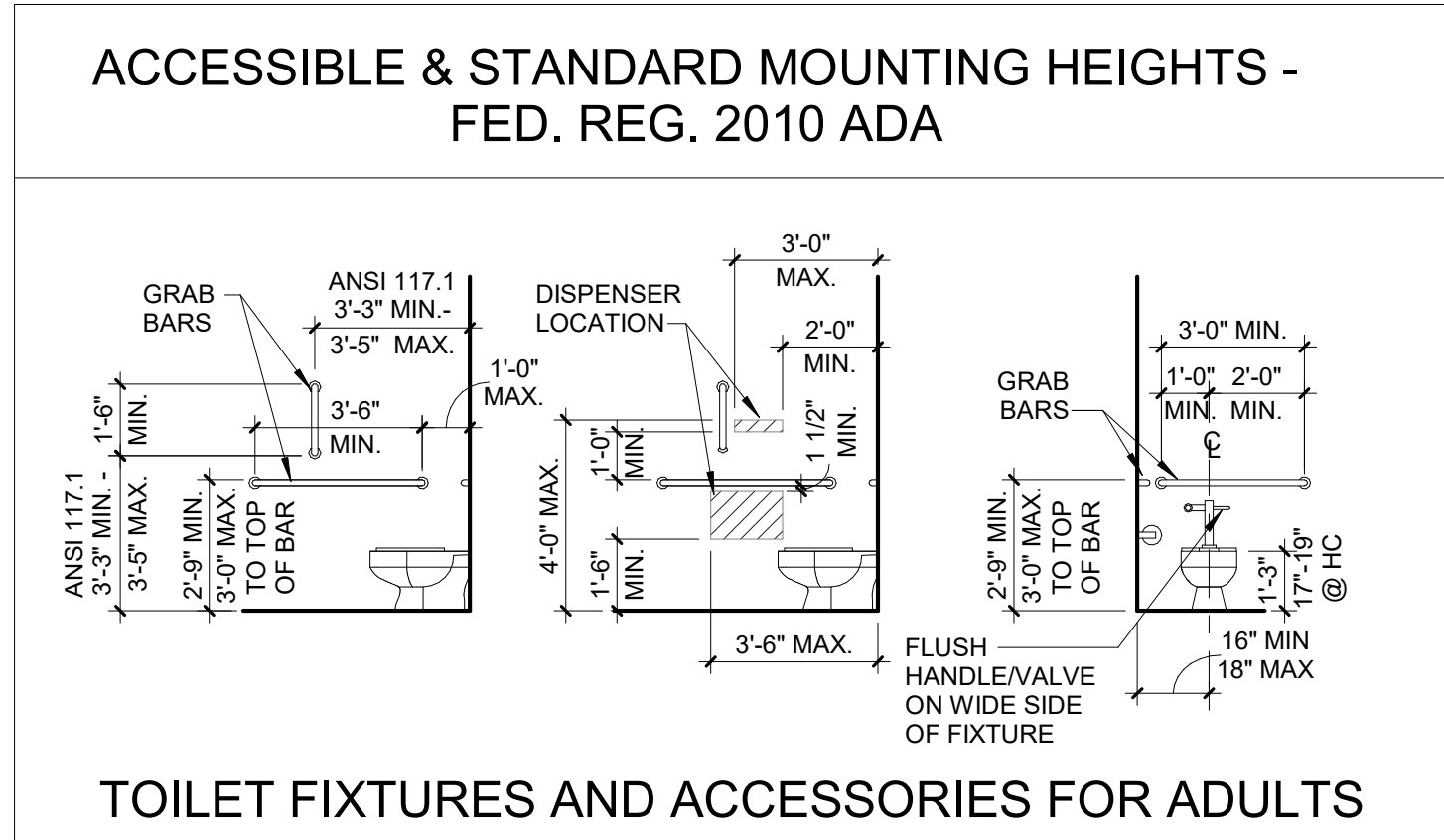
2 FAMILY BATHROOM WEST
ELEVATION
SCALE: 1/4" = 1'-0"



3 FAMILY BATHROOM SOUTH
ELEVATION
SCALE: 1/4" = 1'-0"



4 FAMILY BATHROOM EAST
ELEVATION
SCALE: 1/4" = 1'-0"



TOILET FIXTURES AND ACCESSORIES FOR ADULTS



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Interior Elevations

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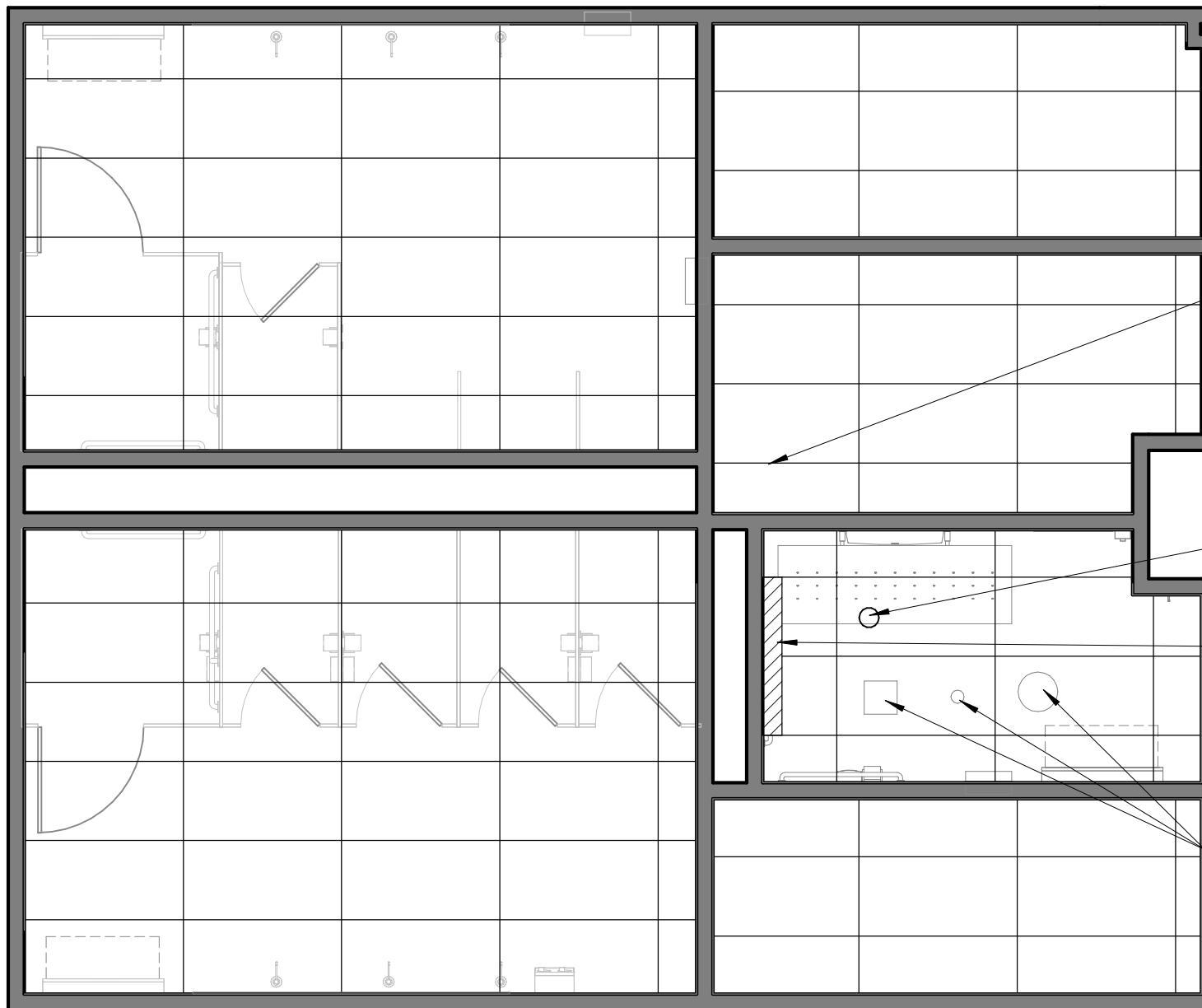
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A7.1

REFLECTED CEILING PLAN NOTES

1. CEILING GRID AND EXISTING CEILING TILE TO REMAIN. MODIFY AS SHOWN ON DRAWINGS.
2. ALL ELECTRICAL, MECHANICAL, PLUMBING AND FIRE PROTECTION DEVICES TO BE CENTERED WITHIN CEILING TILES, U.N.O.
3. REFER TO MECHANICAL, ELECTRICAL, PLUMBING, AND FIRE PROTECTION (IF APPLICABLE) DRAWINGS FOR DUCTWORK, DEVICES, EQUIPMENT, & FIXTURES NOT SHOWN ON THE REFLECTED CEILING PLANS. COORDINATE LOCATION OF THESE ITEMS WITH THOSE SHOWN.



EXISTING GRID AND ACOUSTICAL CEILING TILE TO REMAIN

NEW LIGHT FIXTURE IN EXISTING CEILING TILE, SEE ELECTRICAL

REPLACE CEILING TILE TO MATCH EXISTING AT REMOVED LIGHT FIXTURE, SEE ELECTRICAL. REWORK GRID TO EXTEND TO WALL.

EXISTING DIFFUSER, SPRINKLER HEAD COVER, AND SPEAKER TO REMAIN

2 MAIN RECELECTED CEILING PLAN - ARCHITECTURAL

SCALE: 1/4" = 1'-0"

REFLECTED CEILING PLAN

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Sheet: A8.1

PLUMBING SYMBOLS LIST	
SYMBOL	DESCRIPTION
	HOSE BIBB / WALL HYDRANT
	WATER HAMMER ARRESTOR / SHOCK STOP
	BACKFLOW PREVENTER
	FIXTURE / PIPING TO BE REMOVED
	NEW CONNECTION TO EXISTING PIPING
	KEYED NOTE - DEMOLITION
	KEYED NOTE - EQUIPMENT BY OTHERS
	KEYED NOTE - NEW WORK
	KEYED NOTE - REVISION CALL OUT
F-#	FIXTURE DESIGNATION AND NUMBER
	FLOOR DRAIN - DESIGNATION, NUMBER AND SIZE
	FLOOR SINK - DESIGNATION, NUMBER AND SIZE
	HUB DRAIN - DESIGNATION, NUMBER AND SIZE
	ROOF DRAIN - DESIGNATION, NUMBER AND SIZE
	ELECTRIC WATER COOLER / DRINKING FOUNTAIN
	LAVATORY - SURFACE-MOUNTED
	LAVATORY - WALL-MOUNTED
	SINK - SELF-RIMMING
	SINK - UNDER-MOUNTED
	URINAL - FLUSH VALVE, WALL-MOUNTED
	WATER CLOSET - FLUSH TANK, FLOOR-SET
	WATER CLOSET - FLUSH VALVE, FLOOR-SET
	WATER CLOSET - FLUSH VALVE, WALL-MOUNTED

PLUMBING SYMBOLS LIST	
SYMBOL	DESCRIPTION
	CAPPED HORIZONTAL PIPING
	CAPPED VERTICAL PIPING
	DIRECTION OF FLOW
	ELBOW - TURNED DOWN
	ELBOW - TURNED UP
	TEE - BOTTOM OUTLET
	TEE - TOP OUTLET
	P-TRAP
	CLEANOUT - PLUG TYPE
	CLEANOUT - FLOOR OR YARD
	CLEANOUT - FINISHED WALL
	BACKWATER VALVE
	BALANCING VALVE
	BALL VALVE
	BUTTERFLY VALVE
	CHECK VALVE

PLUMBING ABBREVIATIONS LIST	
ABBR	DESCRIPTION
FWCO	FINISHED WALL CLEANOUT
GC	GENERAL CONTRACTOR
HW	HOT WATER
HWR	HOT WATER RECIRCULATION / RETURN
L	LAVATORY
MB	MOP BASIN
NIC	NOT IN CONTRACT
PC	PLUMBING CONTRACTOR
PVC	POLYVINYL CHLORIDE
S	SINK
SAN	SANITARY
SH	SHOWER
SQFT	SQUARE FEET
TBD	TO BE DETERMINED
TFA	TO FLOOR ABOVE
TFB	TO FLOOR BELOW
TG	TRAP GUARD
TMV	THERMOSTATIC MIXING VALVE
TYP	TYPICAL
U	URINAL
UF	UNDER FLOOR
UG	UNDER GROUND
V	VENT
VTR	VENT THROUGH ROOF
W	WASTE
WC	WATER CLOSET
WHA	WATER HAMMER ARRESTOR
WSFU	WATER SUPPLY FIXTURE UNITS

PLUMBING LINE TYPE LIST	
SYMBOL	DESCRIPTION
	COLD WATER SUPPLY PIPING
	HOT WATER RECIRC / RETURN PIPING
	HOT WATER SUPPLY PIPING
	SANITARY VENT PIPING
	SANITARY WASTE PIPING - ABOVE FLOOR
	SANITARY WASTE PIPING - BELOW FLOOR

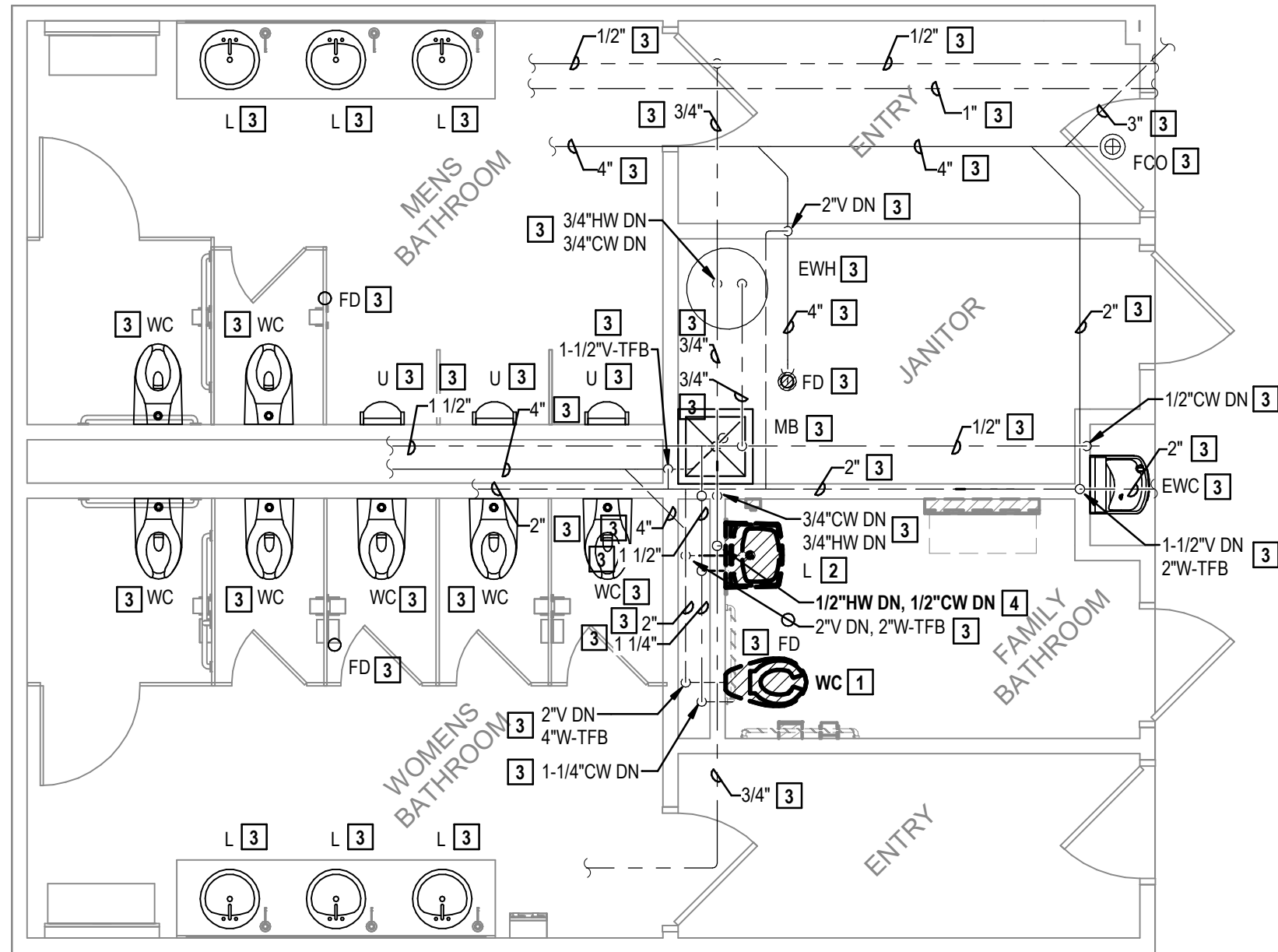
PLUMBING ABBREVIATIONS LIST	
ABBR	DESCRIPTION
A/E	ARCHITECT / ENGINEER
ADA	AMERICANS WITH DISABILITIES ACT
AF	ABOVE FLOOR
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AP	ACCESS PANEL
ARCH	ARCHITECT / ARCHITECTURAL
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS
ASSE	AMERICAN SOCIETY OF SANITARY ENGINEERING
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
BF	BELOW FLOOR
BFF	BELOW FINISHED FLOOR
CO	CLEANOUT
CW	COLD WATER
DFU	DRAINAGE FIXTURE UNITS
DN	DOWN
EC	ELECTRICAL CONTRACTOR
ETR	EXISTING TO REMAIN
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WATER HEATER
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FFA	FROM FLOOR ABOVE
FFB	FROM FLOOR BELOW
FFE	FINISHED FLOOR ELEVATION

NOTE:
THIS IS A COMPOSITE LIST OF SYMBOLS AND ABBREVIATIONS, NOT ALL PERTAIN SPECIFICALLY TO THIS PROJECT.

SHEET INDEX - PLUMBING	
Sheet Number	Sheet Name
P0.0	PLUMBING GENERAL INFORMATION
PD1.1	MAIN FLOOR PLUMBING DEMOLITION PLAN
P1.1	MAIN FLOOR PLUMBING NEW WORK PLAN
P4.1	PLUMBING DETAILS

PLUMBING SHEET KEYNOTES

1. REMOVE EXISTING WATER CLOSET AND FLUSH VALVE TO ALLOW FOR NEW ROOM FINISHES TO BE INSTALLED. SALVAGE WATER CLOSET BOWL AND FLUSH VALVE FOR REINSTALLATION DURING COMPLETION OF THE NEW WORK SCOPE. EXISTING PIPE ROUGH-INS TO REMAIN.
2. REMOVE EXISTING LAVATORY AND FAUCET COMPLETELY TO ACCOMMODATE NEW LAVATORY AND CHANGING TABLE LOCATIONS.
3. EXISTING TO REMAIN.
4. REMOVE EXISTING WATER SUPPLY PIPING FOR LAVATORY BEING REMOVED AS SHOWN AND CAP WATER SUPPLIES AT NEAREST ACTIVE PIPING INTENDED TO REMAIN.



1 MAIN FLOOR PLUMBING DEMOLITION PLAN

SCALE: 1/4" = 1'-0"



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Sheet Title
 MAIN FLOOR PLUMBING DEMOLITION PLAN

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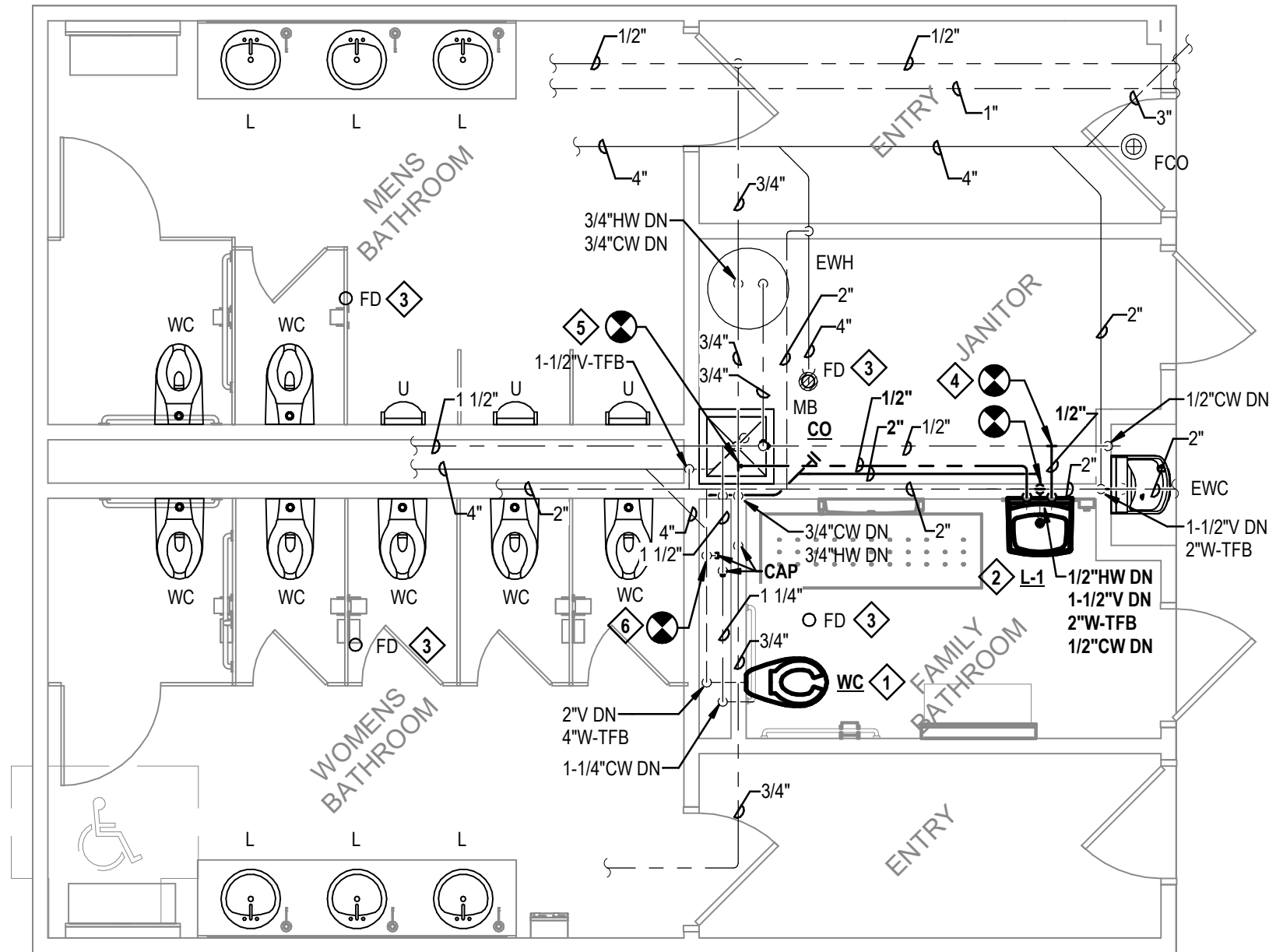
Date Issued: 05/25/23
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Sheet
 PD1.1

PLUMBING SHEET KEYNOTES

1. REINSTALL SALVAGED WATER CLOSET AND FLUSH VALVE AFTER NEW FINISHES ARE COMPLETED. CONNECT INTO EXISTING PIPING REMAINING FROM PREVIOUS INSTALLATION.
2. INSTALL NEW LAVATORY AND EXTEND 2"W, 1-1/2"V, 1/2"CW, AND 1/2"HW TO NEW FIXTURE LOCATION AS SHOWN.
3. INSTALL NEW ASSE 1072 TRAP GUARD IN EXISTING FLOOR DRAIN. POLISH FLOOR DRAIN COVER TO "LIKE NEW" CONDITION.
4. CONNECT TO EXISTING 1/2"CW ABOVE CEILING AS SHOWN.
5. CONNECT TO EXISTING 1/2"HW ABOVE CEILING AS SHOWN.
6. CONNECT TO EXISTING WASTE PIPING IN PLUMBING CHASE FROM PREVIOUSLY REMOVED LAVATORY AS SHOWN.



1 MAIN FLOOR PLUMBING NEW WORK PLAN

SCALE: 1/4" = 1'-0"



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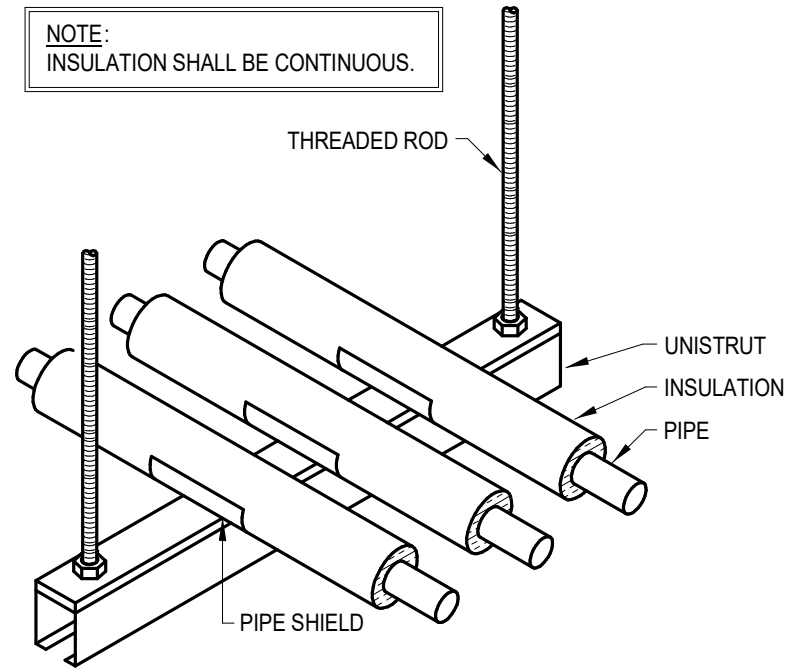
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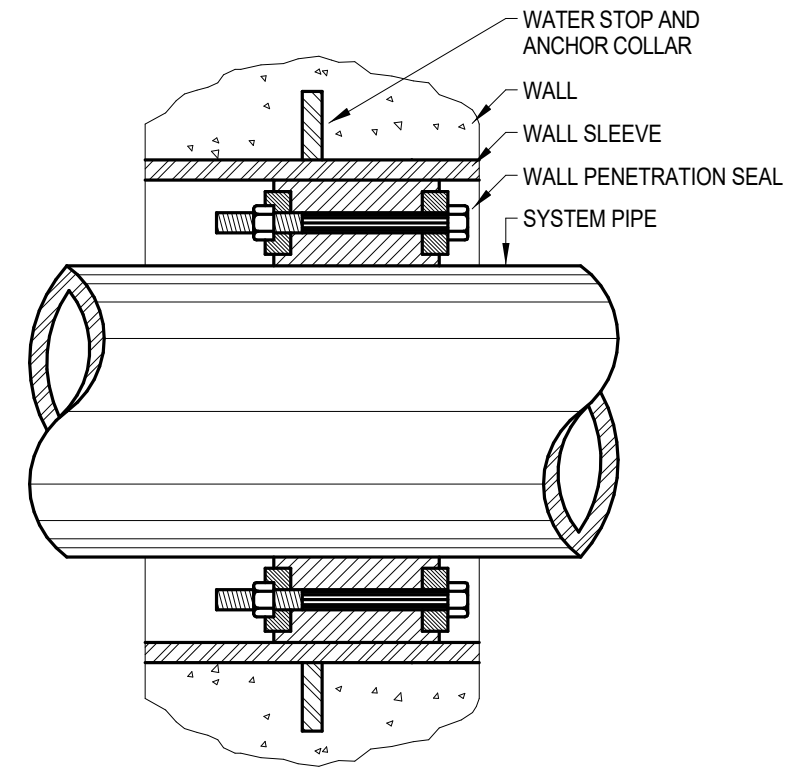
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3

TRAPEZE PIPE SUPPORT DETAIL

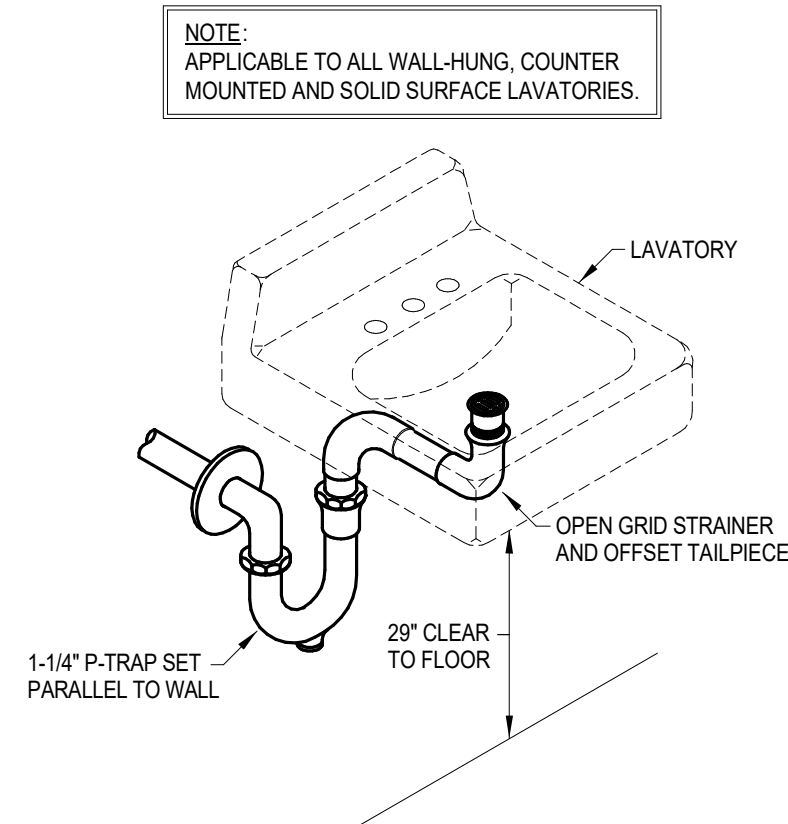
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1

PIPE THROUGH WALL PENETRATION ASSEMBLY DETAIL

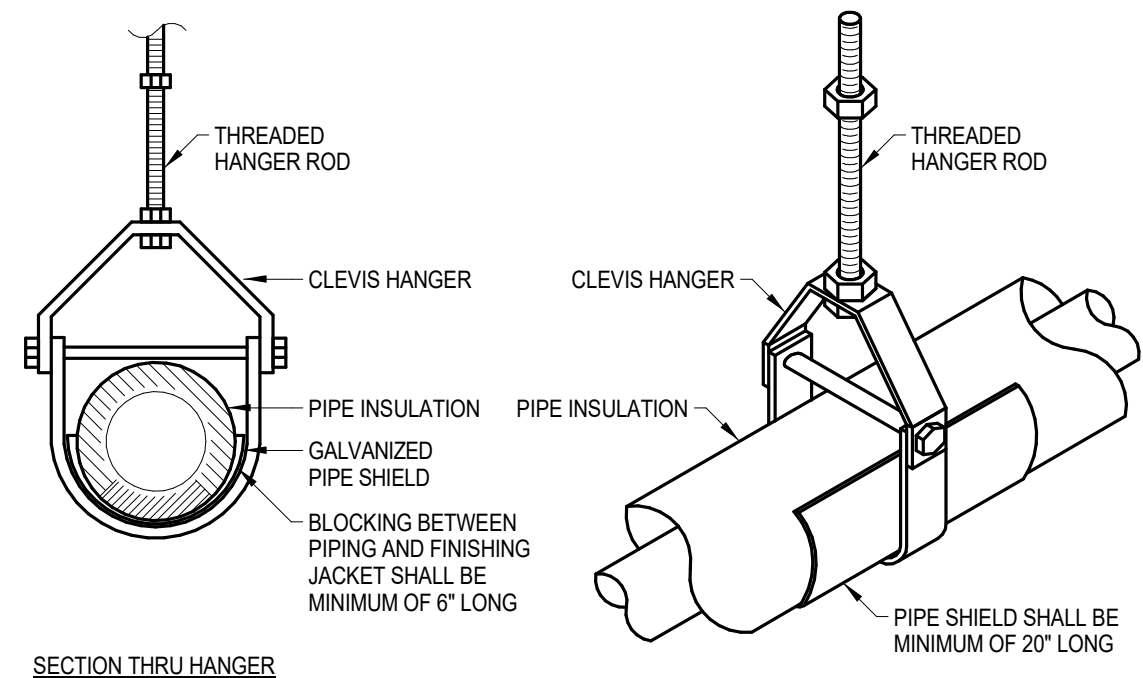
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4

TYPICAL ADA LAVATORY P-TRAP INSTALLATION DETAIL

NO SCALE



2

INSULATED PIPE SUPPORT DETAIL (TYPICAL)

NO SCALE



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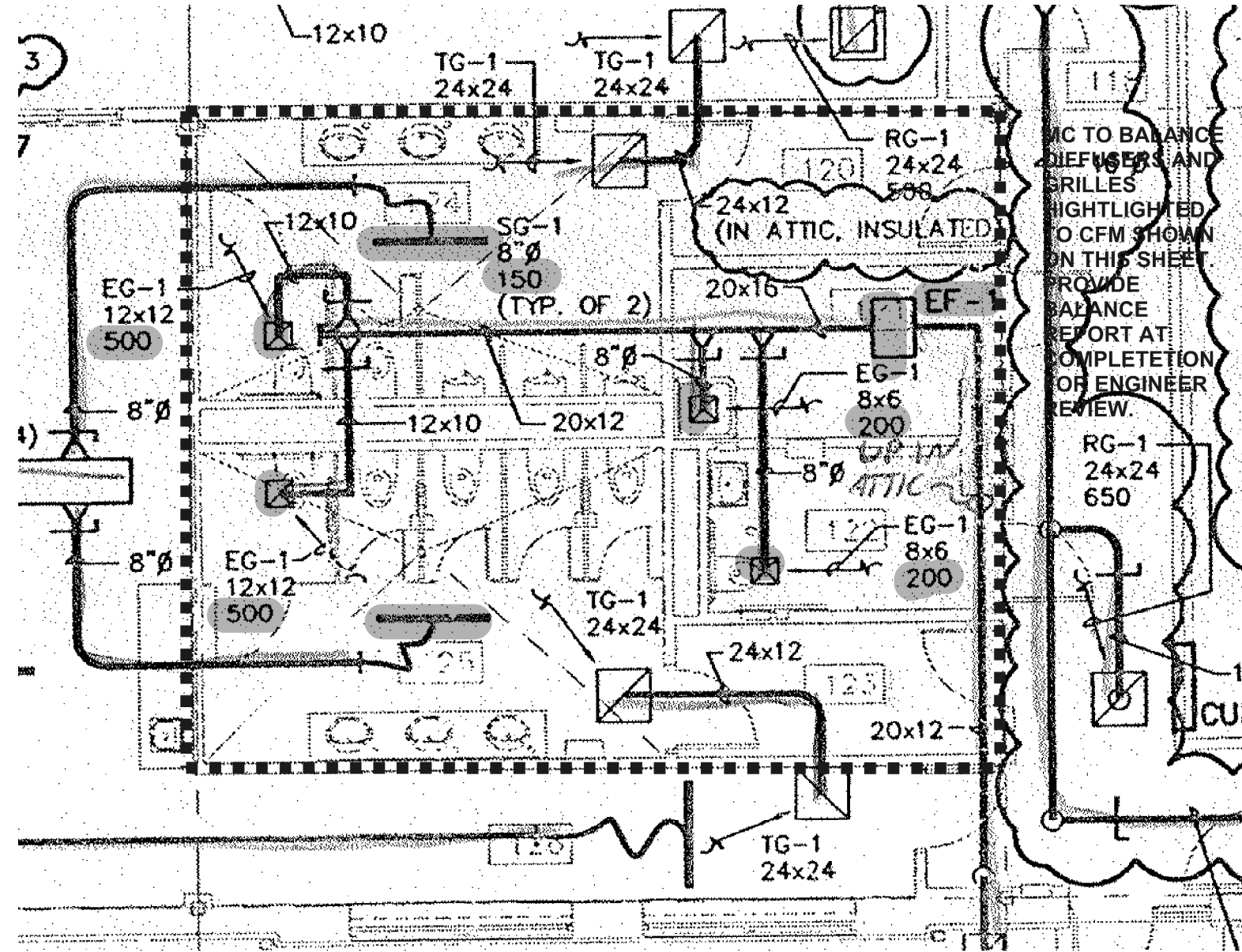
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P4.1

CABINET EXHAUST FANS

MANUFACTURER : GREENHECK

REF	EF-1	EF-2	EF-3	
LOCATION	RESTROOMS	KITCHEN	RESTROOMS	-
SERVICE	AHU-2	AHU-2	AHU-1	-
MODEL	CSP-275	SP-228	CSP-262	-
DRIVE	DIRECT	DIRECT	DIRECT	-
AIRFLOW	CFM	CFM	CFM	-
SP	in. wg	in. wg	in. wg	-
FAN SPEED	RPM	RPM	RPM	-
SONES				-
ELECTRICAL :				-
SUPPLY	V/PH/HZ	V/PH/HZ	V/PH/HZ	-
FAN MOTOR	WATTS	WATTS	WATTS	-
REMARKS	WITH SPEED CONTROL			-



1 MAIN FLOOR BALANCING PLAN
SCALE: NO SCALE

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Sheet: M1.1




GENERAL ELECTRICAL NOTES:

1. DO NOT SCALE DRAWINGS:
THE CONTRACTORS SHALL USE DIMENSIONS SHOWN ON THE DRAWINGS AND ACTUAL FIELD MEASUREMENT. NOTIFY THE ARCHITECT/ENGINEER PROJECT MANAGER, IF ANY DISCREPANCIES ARE FOUND PRIOR TO PROCEEDING WITH WORK.
2. ALL BRANCH CIRCUITS SHALL HAVE EQUIPMENT GROUND CONDUCTORS.
3. THE ELECTRICAL CONTRACTOR SHALL PROVIDE, IF REQUIRED, ADJUSTMENTS (±) 6'-0" IN THE LOCATION OF ALL SYSTEM DEVICES, FIXTURES, OUTLETS, PANELS, ETC. IN ORDER TO EXPEDITE THE ELECTRICAL WORK. THE POSITION OF ALL WORK AS SHOWN IS INTENDED TO BE FIXED AND IN THE PROPER LOCATION. SUCH REQUIRED ADJUSTMENT SHALL BE DETERMINED BY THE A/E.
4. ALL RECEPTACLES SHALL BE PROVIDED WITH LABELS IDENTIFYING THE PANEL NAME AND CIRCUIT BRANCH, FIRMLY ATTACHED, TO THE OUTSIDE OF THE COVERPLATE.
5. PROVIDE SEPARATE NEUTRAL FOR EACH BRANCH CIRCUIT PHASE CONDUCTOR.
6. SEE ARCHITECTURAL SHEETS FOR EXACT LOCATION OF DEVICES. DEVICES SHOWN ON ARCHITECTURAL ELEVATIONS. COORDINATE LOCATION OF DEVICES WITH ARCHITECT'S FIELD PERSON TO ENSURE PROPER LOCATION AND HEIGHT.
7. PROVIDE FIRESTOPPING FOR DIV 26, 27 AND 27 PENETRATIONS.
8. ALL CONDUIT SHALL BE CONCEALED IN FINISHED AREAS, UNLESS NOTED OTHERWISE.
9. DISCONNECT SWITCHES, STARTERS, HAND CONTROL DEVICES ARE SHOWN DIAGRAMMATICALLY ONLY AND SHALL BE INSTALLED IN ACCESSIBLE LOCATIONS WITHIN LINE OF SITE TO EQUIPMENT THEY SERVE. MOUNT DISCONNECT SWITCHES AND STARTERS AT 6'-3" MAX ABOVE FINISHED FLOOR, HEIGHT TO TOP OF ENCLOSURE.
10. ALL WORK SHALL COMPLY WITH NEC2017, IFC 2018, LOCAL ORDINANCES, UTILITY COMPANY REQUIREMENTS AND STATE ADOPTED BUILDING CODES.

SHEET KEYED NOTED

	NEW WORK KEYED NOTE
	DEMOLITION WORK KEYED NOTE

LINE WEIGHT KEY

	ALL ITEMS INDICATED BY A DARK SOLID LINE ARE NEW
	ALL ITEMS INDICATED BY A LIGHT SOLID LINE ARE EXISTING TO REMAIN
	ALL ITEMS INDICATED BY A DARK DASHED LINE ARE EXISTING TO BE REMOVED OR RELOCATED.

GENERAL ELECTRICAL DEMOLITION REQUIREMENTS:

1. IT IS MANDATORY THAT THE EXISTING BUILDING REMAIN IN CONTINUOUS AND NON-INTERRUPTED OPERATION DURING REMODELING/ALTERING. SERVICES TO EXISTING BUILDING SHALL BE KEPT ON CONTINUOUS OPERATION INCLUDING POWER, LIGHTING, TELEPHONE, FIRE ALARM, ETC. ANY ABSOLUTELY NECESSARY INTERRUPTION OF THESE SERVICES TO ACCOMPLISH PROJECT CONSTRUCTION, SHALL BE HELD TO A MINIMUM AND ARRANGED WITH THE OWNER THROUGH THE GENERAL CONTRACTOR TWO (2) WEEKS IN ADVANCE. TEMPORARY SERVICES SHALL BE FURNISHED AND INSTALLED WHERE NECESSARY TO ACCOMPLISH THIS PURPOSE. TEMPORARIES SHALL BE REMOVED ONLY AFTER NEW PERMANENT SERVICES ARE INSTALLED AND FULLY OPERATIONAL.
2. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR HIS OWN DEMOLITION, REMOVAL, CAPPING, STORING, ABANDONING, DISCONNECTING, RELOCATING AND RECONNECTION OF EXISTING ELECTRICAL EQUIPMENT AND MATERIAL. ALL CUTTING, PATCHING, REPAIRING, REPLACEMENT AND REFINISHING, SHALL MATCH THE EXISTING CONSTRUCTION AS NEARLY AS POSSIBLE.
3. EXCEPT WHERE OTHERWISE SHOWN OR NOTED ON DRAWING - "TO BE RETAINED, RELOCATED" OR HEREINAFTER NOTED, ALL EXISTING ELECTRICAL EQUIPMENT AND MATERIAL IN AREAS TO BE REMODELED/ALTERED SHALL BE REMOVED WHERE THEY INTERFERE WITH PROPOSED NEW CONSTRUCTION AND/OR INTERFERE WITH PROPOSED USAGE OF SPACE BY OWNER AS FOLLOWS:
 - A. REMOVE ANY CONDUITS PROTRUDING ABOVE FINISHED FLOOR, CAP AND FINISH OVER WITH FLOOR MATERIAL TO MATCH EXISTING.
 - B. REMOVE ALL LIGHT FIXTURES, RECEPTACLES, SWITCHES, ETC. AND ASSOCIATED WIRING.REMOVE ALL SURFACE MOUNTED CONDUIT/BOXES AND THEIR ASSOCIATED WIRING.
 - C. REMOVE ALL CONCEALED RACEWAYS, BOXES AND WIRING FROM PARTITIONS BEING DEMOLISHED.
 - D. REMOVE ALL EXISTING WIRING/CABLING FROM ALL EXISTING CONCEALED RACEWAYS IN PARTITION THAT ARE TO REMAIN.
 - E. ANY FEEDERS, CONDUITS, BRANCH CIRCUITS, SIGNAL AND TELEPHONE CIRCUITS, ETC. PASSING THROUGH THE REMODELED AREAS TO SERVE (OR BE SERVED FROM) EXISTING ADJACENT, REMOTE OR SURROUNDING AREAS THAT ARE TO REMAIN, SHALL BE RETAINED AND KEPT OPERATIONAL AND SHALL BE REROUTED IN ALL CASES WHERE THEY INTERFERE WITH ANY NEW WORK OR USAGE TO BE ACCOMPLISHED IN THE REMODELED AREA.
 - F. WHERE DEVICES ARE OMITTED FROM PRESENT BRANCH CIRCUITS, THE REMAINING DEVICES SHALL BE REWIRED, IF NEEDED AND AS REQUIRED, TO REMAIN ON THEIR RESPECTIVE CIRCUITS AND IN OPERATING CONDITION.
4. ELECTRICAL CONTRACTOR SHALL REFER TO ARCHITECTURAL DRAWINGS TO FAMILIARIZE HIMSELF WITH EXTENT OF ALTERATION/REMODELING WORK AND MORE SPECIFICALLY NOTE WHERE NEW PARTITIONING IS BEING INSTALLED, WHERE EXISTING PARTITIONING IS BEING REMOVED, WHERE CEILINGS ARE BEING REMOVED AND OR REPLACED, ETC.
5. ALL WIRING (POWER, LIGHTING) NOT REUSED FOR REMODELING AREAS SHALL BE COMPLETELY REMOVED BACK TO ASSOCIATED PANELS. EMPTY BOXES AND CONDUITS SHALL BE REMOVED BEYOND REMODELED AREA (ABOVE CEILING).
6. THE OWNER SHALL HAVE THE FIRST CHOICE TO ACCEPT EXISTING DEVICES BEING REMOVED.



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


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

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

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


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
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LIGHTING FIXTURES	
SYMBOL	DESCRIPTION
 <p>F1 — FIXTURE TYPE 23a — CONTROL DEVICE CIRCUIT</p>	
	RECESSED LINEAR, NORMAL POWER
	WALL MOUNTED SCONCE OR VANITY, NORMAL POWER

SWITCHES	
SYMBOL	DESCRIPTION
 <p>X — CONTROL DESIGNATION</p>  <p>SWITCH TYPES: OS - WALL BOX OCCUPANCY SENSOR</p>	SINGLE POLE (LOWER CASE LETTER INDICATES SWITCH LEG)

RECEPTACLES	
SYMBOL	DESCRIPTION
 <p>DUPLEX RECEPTACLE TYPES: G - GROUND FAULT CIRCUIT INTERRUPTER</p>	DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE ABOVE COUNTER

POWER SYSTEMS	
SYMBOL	DESCRIPTION
	BRANCH PANEL WITH DESIGNATION
	MOTOR RATED TOGGLE SWITCH
 <p>CONNECTION TYPES: REFER TO EQUIPMENT CONNECTION SCHEDULE(S)</p>	EQUIPMENT CONNECTION - EMERGENCY
	DENOTES WALL MOUNTING

FIRE ALARM SYSTEM	
SYMBOL	DESCRIPTION
	NEW WALL MOUNTED FIRE ALARM STROBE, (##) IS CANDELA RATING



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Sheet Title
ELECTRICAL SYMBOLS

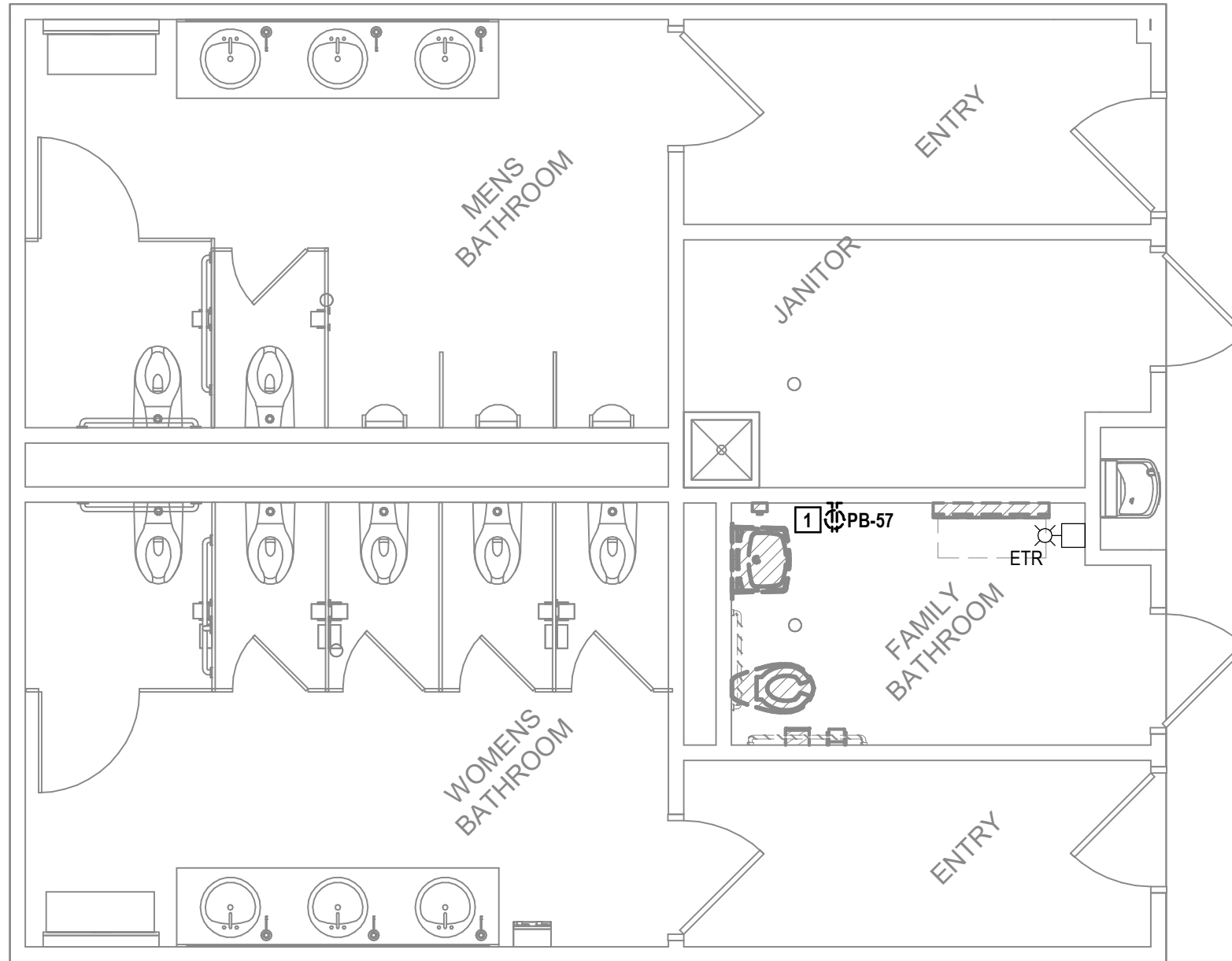
Project Title
MUSKEGO PUBLIC LIBRARY
MUSKEGO PUBLIC LIBRARY
FAMILY BATHROOM REMODEL
S73W16663 JANESVILLE RD
MUSKEGO, WI 53150

Date Issued: 05/25/23
Date Revised:

Project Number
2022329

Sheet

E0.1



1 MAIN FLOOR ELECTRICAL DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

ELECTRICAL SHEET GENERAL NOTES

1. REFER TO SHEET E0.0 FOR GENERAL DEMOLITION WORK NOTES AND WORK REQUIREMENTS.
2. REFER TO ARCHITECTURAL DESIGN DRAWINGS FOR ADDITIONAL COORDINATION.
3. ELECTRICAL PANEL "PB" LOCATED IN ROOM 103.
4. CIRCUITS SHOWN ARE REFERENCE TO CIRCUITS BEING AFFECTED BY DEMOLITION WORK; CIRCUITS BASED ON SITE VISIT AND EXISTING RECORD DRAWINGS. EC SHALL FIELD VERIFY ALL EXISTING CIRCUITS BEFORE PROCEEDING WITH DEMOLITION WORK.
5. DEVICES AND EQUIPMENT SHOWN WITH "ETR" ARE EXISTING TO REMAIN.

ELECTRICAL SHEET KEYNOTES

1. EC SHALL REMOVE AND SALVAGE WIRING DEVICE. EC SHALL REMOVE RACEWAY AND CONDUCTORS BACK TO NEAREST ACCESSIBLE JUNCTION BOX, MAINTAIN CIRCUIT. EC SHALL COORDINATE WITH GC FOR WALL REPAIR.



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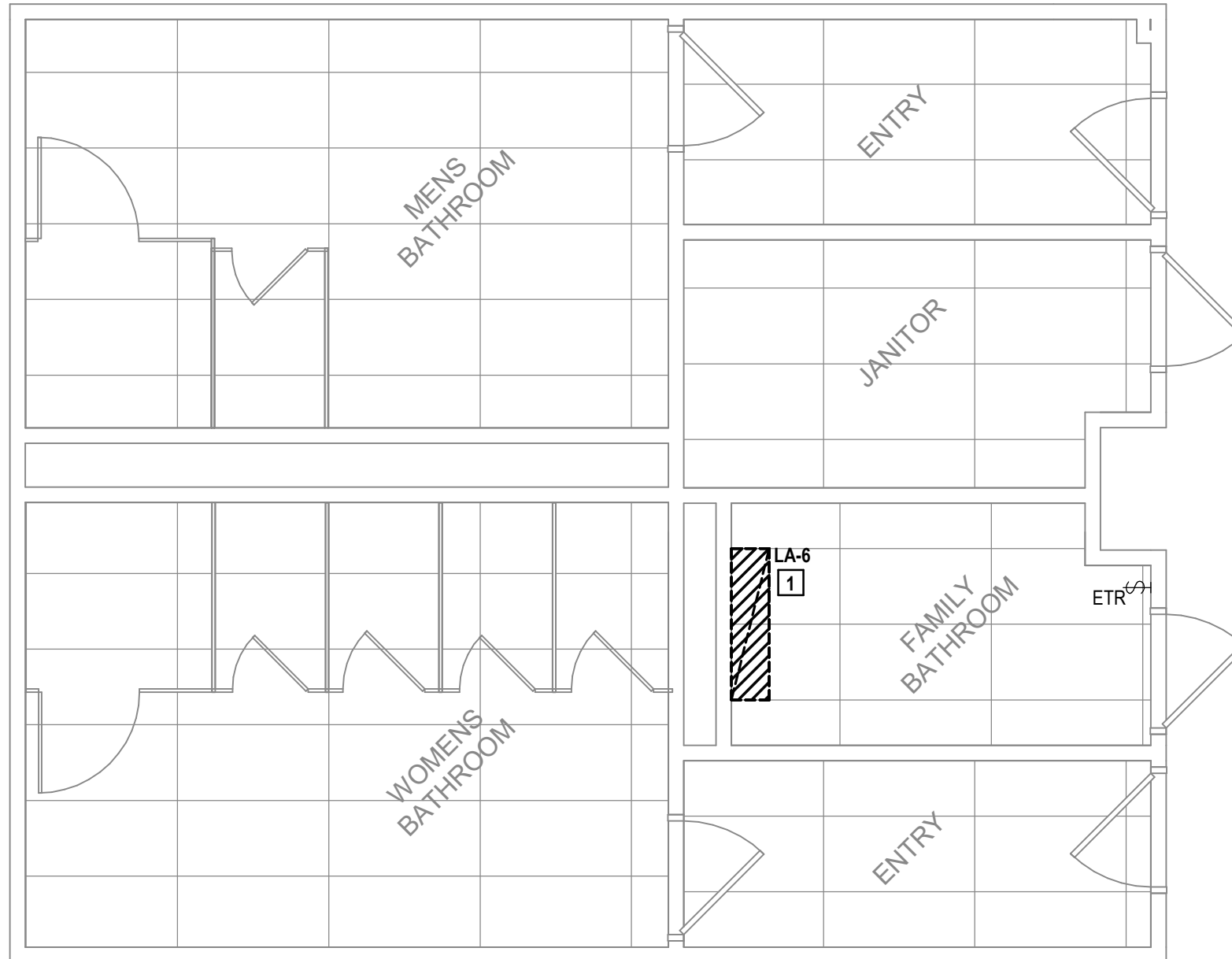
Sheet Title
 MAIN FLOOR ELECTRICAL DEMOLITION PLAN

Project Title
 MUSKEGO PUBLIC LIBRARY
 MUSKEGO PUBLIC LIBRARY
 FAMILY BATHROOM REMODEL
 S73W16663 JANESVILLE RD
 MUSKEGO, WI 53150

Date Issued: 05/25/23
 Date Revised:

Project Number
 2022329

Sheet
 ED1.1



1 MAIN FLOOR LIGHTING DEMOLITION PLAN

SCALE: 1/4" = 1'-0"

ELECTRICAL SHEET GENERAL NOTES

1. REFER TO SHEET E0.0 FOR GENERAL DEMOLITION WORK NOTES AND WORK REQUIREMENTS.
2. REFER TO ARCHITECTURAL DESIGN DRAWINGS FOR ADDITIONAL COORDINATION.
3. ELECTRICAL PANEL "LA" LOCATED IN ROOM 145.
4. CIRCUITS SHOWN ARE REFERENCE TO CIRCUITS BEING AFFECTED BY DEMOLITION WORK; CIRCUITS BASED ON SITE VISIT AND EXISTING RECORD DRAWINGS. EC SHALL FIELD VERIFY ALL EXISTING CIRCUITS BEFORE PROCEEDING WITH DEMOLITION WORK.
5. DEVICES AND EQUIPMENT SHOWN WITH "ETR" ARE EXISTING TO REMAIN.

ELECTRICAL SHEET KEYNOTES

1. EC SHALL REMOVE LIGHT FIXTURE. EC SHALL REMOVE RACEWAY AND CONDUCTORS BACK TO NEAREST ACCESSIBLE JUNCTION BOX, MAINTAIN CIRCUIT AND SWITCH LEG. EC SHALL COORDINATE WITH GC FOR CEILING REPAIR.



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Sheet Title
 MAIN FLOOR LIGHTING DEMOLITION PLAN

Project Title
 MUSKEGO PUBLIC LIBRARY
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 FAMILY BATHROOM REMODEL

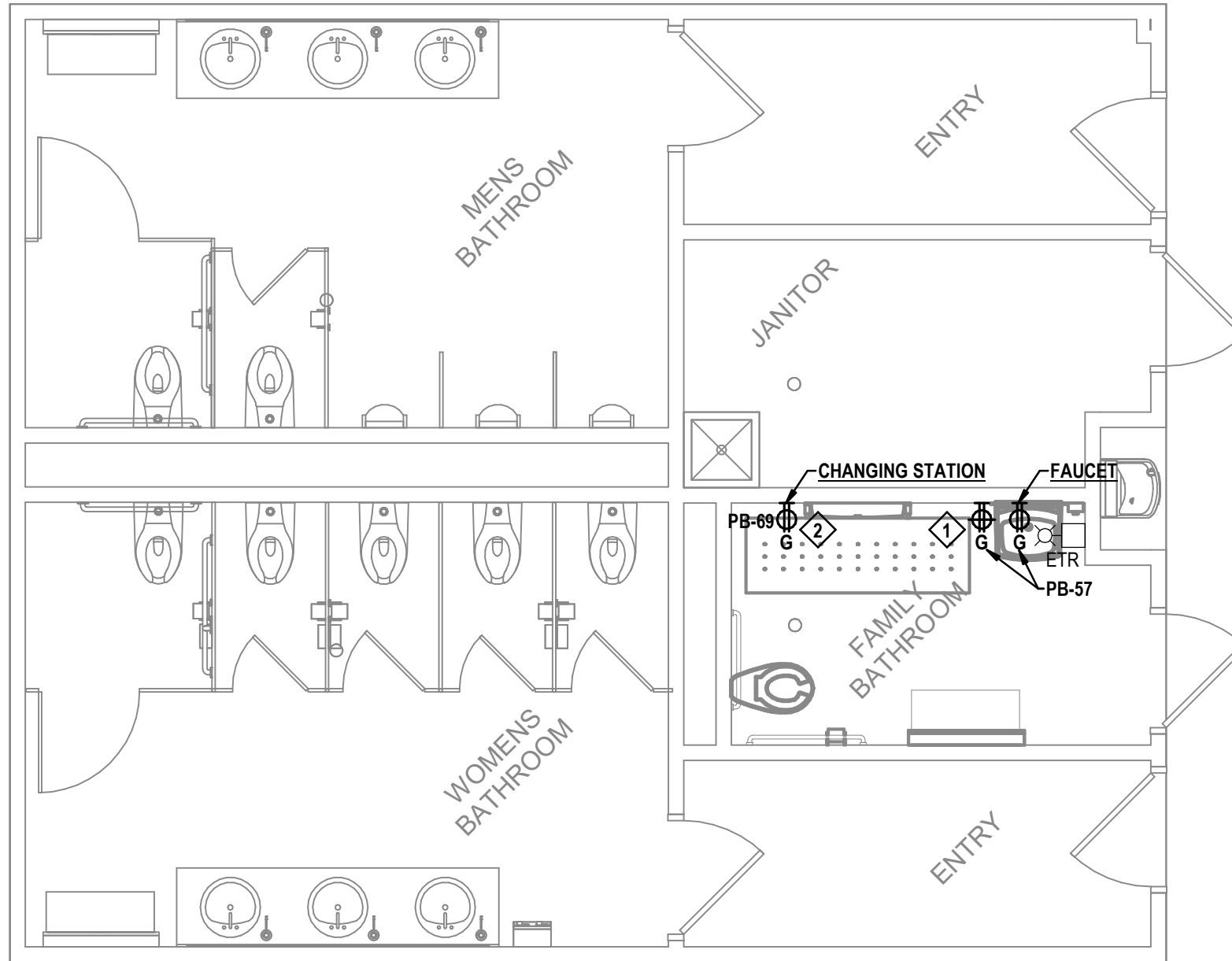
S73W16663 JANESVILLE RD
 MUSKEGO, WI 53150

Date Issued: 05/25/23
 Date Revised:

Project Number
 2022329

Sheet

ED2.1



1 MAIN FLOOR ELECTRICAL NEW WORK PLAN

SCALE: 1/4" = 1'-0"

ELECTRICAL SHEET GENERAL NOTES

1. REFER TO SHEET E0.0 FOR GENERAL NEW WORK NOTES AND WORK REQUIREMENTS.
2. REFER TO ARCHITECTURAL DESIGN DRAWINGS FOR ADDITIONAL COORDINATION.
3. ELECTRICAL PANEL "PB" LOCATED IN ROOM 103.
4. DEVICES AND EQUIPMENT SHOWN WITH "ETR" ARE EXISTING TO REMAIN.
5. FOR DEVICES INSTALLED ON EXISTING TO REMAIN WALLS, EC SHALL INSTALL WITH CONCEALED RACEWAY. EC SHALL FISH RACEWAY INTO WALL WITH CUT-IN BOX.

ELECTRICAL SHEET KEYNOTES

1. EC SHALL INSTALL SALVAGED WIRING DEVICE. EC SHALL EXTEND PREVIOUSLY MAINTAINED BRANCH CIRCUIT TO NEW LOCATION.
2. EC SHALL FURNISH AND INSTALL "IPX6" COVER OVER RECEPTACLE PER CHANGING STATION MANUFACTURER'S SPECIFICATIONS.



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Sheet Title
 MAIN FLOOR ELECTRICAL NEW WORK PLAN

Project Title
 MUSKEGO PUBLIC LIBRARY
 FAMILY BATHROOM REMODEL

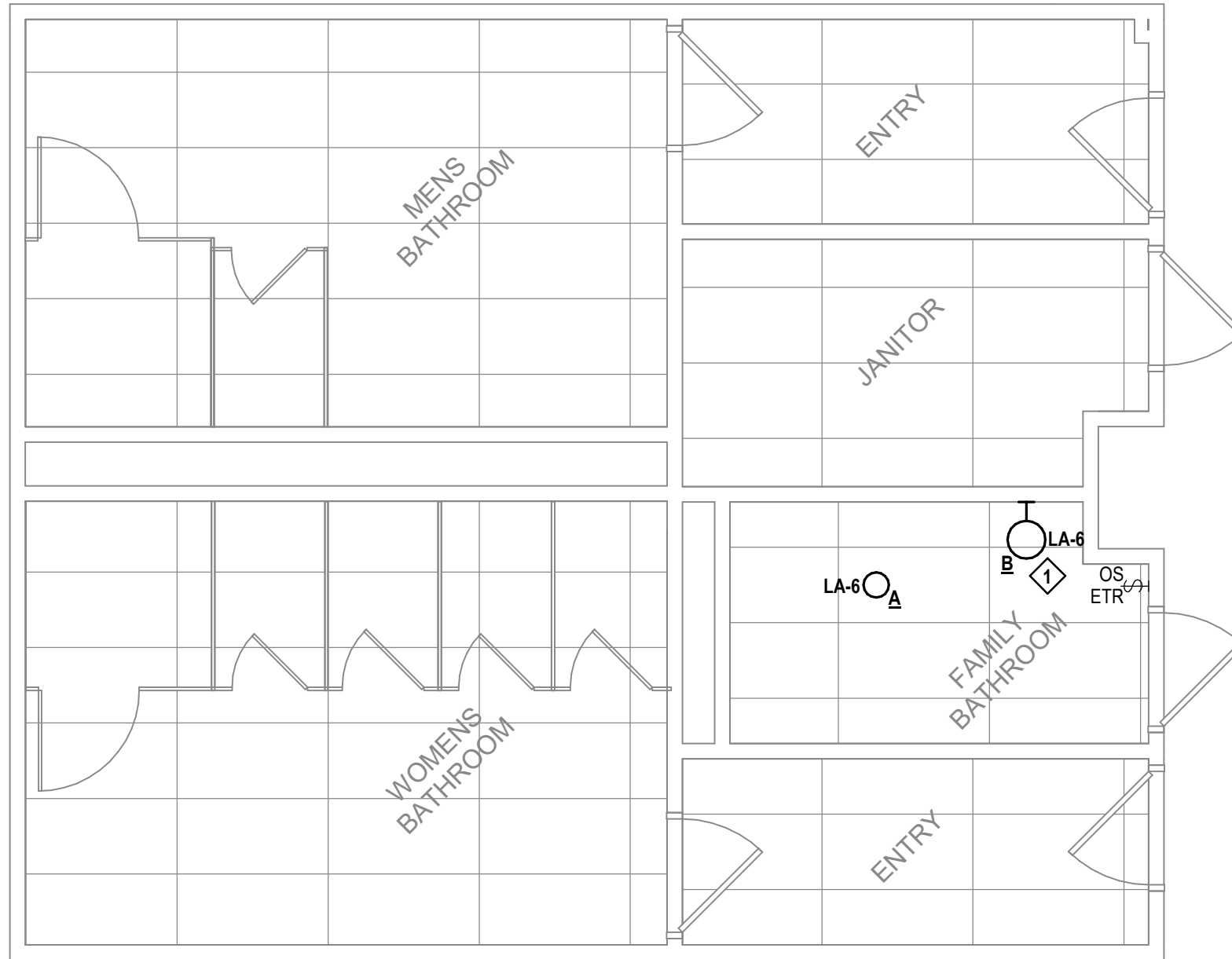
S73W16663 JANESVILLE RD
 MUSKEGO, WI 53150

Date Issued: 05/25/23
 Date Revised:

Project Number
 2022329

Sheet

E1.1



1 MAIN FLOOR LIGHTING NEW WORK PLAN

SCALE: 1/4" = 1'-0"

ELECTRICAL SHEET GENERAL NOTES

1. REFER TO SHEET E0.0 FOR GENERAL NEW WORK NOTES AND WORK REQUIREMENTS.
2. REFER TO ARCHITECTURAL DESIGN DRAWINGS FOR ADDITIONAL COORDINATION.
3. ELECTRICAL PANEL "LA" LOCATED IN ROOM 145.
4. DEVICES AND EQUIPMENT SHOWN WITH "ETR" ARE EXISTING TO REMAIN.
5. EC SHALL COORDINATE WITH GC FOR CEILING MODIFICATIONS FOR NEW LIGHT FIXTURES.
6. EC SHALL EXTEND PREVIOUSLY MAINTAINED BRANCH CIRCUIT AND SWITCH LEG TO ALL NEW LIGHT FIXTURES.

ELECTRICAL SHEET KEYNOTES

1. EC SHALL INSTALL NEW VANITY LIGHT ON EXISTING WALL WITH CONCEALED RACEWAY. EC SHALL FISH RACEWAY IN WALL WITH CUT-IN BOX.



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Sheet Title
 MAIN FLOOR LIGHTING NEW WORK PLAN

Project Title
 MUSKEGO PUBLIC LIBRARY
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 MUSKEGO, WI 53150

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Sheet

E2.1

LIGHTING FIXTURE SCHEDULE

Fixture Designation	FIXTURE DESCRIPTION	SOURCE				BALLAST/DRIVER/POWER SUPPLY				MOUNTING			MANUFACTURER		SEE NOTE
		TYPE	TEMP	CRI	LUMENS	DIM TYPE	DIM RANGE	INPUT WATTS	VOLTAGE	LOCATION	CONFIGURATION	HEIGHT	NAME	MODEL NUMBER	
A	4" LED RECESSED CAN	LED	3000 K	85	500	0-10V	10-100%	7.2 W	120 V	CEILING	RECESSED	AT CEILING	GOHAM	EVO4 30/05 AR LSS MWD MVOLT GZ10	
B	LED VANITY LIGHT	LED	3000 K	94	1300	--	--	18.0 W	120 V	WALL	SURFACE	6'-9"	LITHONIA	FMVCSL 24IN MVOLT 30K 90CRI BN	

ABBREVIATIONS

0-10V - ZERO TO TEN VOLT DC DIMMING FEATURE
 GWB - GYPSUM WALL BOARD, DRYWALL
 ACT - ACOUSTICAL CEILING TILE IN SUSPENDED GRID SYSTEM, ACCESSIBLE
 MVOLT - 120 & 277 VOLT COMPATIBLE

GENERAL NOTES

- A. REFER TO INTERIOR AND EXTERIOR LIGHTING SPECIFICATIONS FOR ADDITIONAL INFORMATION REGARDING FIXTURE, BALLAST OR DRIVER REQUIREMENTS AND INSTALLATION REQUIREMENTS.
- B. NOTED LUMEN QUANTITY IS DELIVERED LUMEN OUTPUT.
- C. NOTED DIMMING RANGE INDICATES MINIMUM PARAMETERS. LUMINAIRES WITH GREATER DIMMING RANGE ARE PERMITTED.
- D. FIXTURE TYPES WITHOUT FINISH OR COLOR SELECTION SHALL BE DETERMINED ON SUBMITTAL. STANDARD OFFERING WILL BE SELECTED.
- E. FIXTURES NOTED IN THIS SCHEDULE ARE TO ESTABLISH A BASIS OF DESIGN. PRODUCTS OTHER THAN THOSE LISTED IN THE SCHEDULE ARE PERMITTED SUBJECT TO APPROVAL FROM A/E PRIOR TO BIDDING.

NOTES

- 1. NOTE.



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Sheet Title
ELECTRICAL SCHEDULES

Project Title
**MUSKEGO PUBLIC LIBRARY
 MUSKEGO PUBLIC LIBRARY
 FAMILY BATHROOM REMODEL**
 S73W16663 JANESVILLE RD
 MUSKEGO, WI 53150

Date Issued: 05/25/23
 Date Revised:

Project Number
 2022329

Sheet

E6.0

Council Date

July 11, 2023

Total Vouchers All Funds

\$ 702,024.80

Total Voucher Approval

Utility Vouchers (Approve Separately)

Water Vouchers \$ 40,569.55

Water Wire Transfers

Total Water \$ 40,569.55

Sewer Vouchers 132,136.05

Sewer Wire Transfers

Total Sewer \$ 132,136.05

Net Total Utility Vouchers \$ 172,705.60

#1 - Utility Voucher Approval

Tax Vouchers - Refunds & Tax Settlements (Approve Separately)

Tax Vouchers \$

Tax Void Checks (

Total Tax Vouchers \$ -

#2 - Tax Voucher Approval

Total General Fund Vouchers (Approve Separately)

General Fund Vouchers \$ 529,319.20

Total General Fund Vouchers \$ 529,319.20

#3 - General Voucher Approval

Big Muskego Lake Vouchers

\$

Development Fund Vouchers

\$

Wire transfers (Approve Separately):

Debt Service \$

Payroll/Invoice Transmittals \$ 525,043.98

#4 - Wire Transfers Approval

Void Checks Since Last Report

Check Amount
164709 \$100.00

Check # Amount

Total ***

Total \$ 100.00 *

Total ***

Report Criteria:
 Detail report.
 Invoices with totals above \$0 included.
 Paid and unpaid invoices included.
 [Report].Description = {<-} "1099 adjustment"

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
ABBIEE LIEDTKE								
06262023	1	Invoice	LANDFILL MEETING 06/26/2023	06/27/2023	07/05/2023	50.00	723	207.01.00.00.6055
Total ABBIEE LIEDTKE:						50.00		
ABRAHAM'S ON-SITE SHREDDING SERVICE								
00130072	2	Invoice	CONTAINER SERVICE - PD	06/27/2023	07/12/2023	45.00	623	100.02.20.01.5723
00130072	1	Invoice	CONTAINER SERVICE - CH	06/27/2023	07/12/2023	54.00	623	100.01.06.00.5701
Total ABRAHAM'S ON-SITE SHREDDING SERVICE:						99.00		
AMAZON CAPITAL SERVICES								
19DM-YM64-J	1	Invoice	PLAYGROUND SUPPLIES	06/19/2023	07/19/2023	81.18	723	100.05.72.16.5702
1FPN-GFL9-G	1	Invoice	SWITCH & PLAYSTATION GAMES	06/24/2023	07/24/2023	259.88	723	100.05.71.03.5711
1GJ3-C9MT-6	1	Invoice	PHONE REPLACEMENTS	06/16/2023	07/16/2023	923.94	723	100.01.14.00.5506
1HWL-K73M-T	1	Invoice	IDLE ISLE KAYAK RENTAL REPAIR	07/02/2023	08/01/2023	88.47	723	100.05.72.19.5702
1JQ6-H4CD-4	1	Invoice	DOG WASTE BAGS FOR BINDI'S D	06/28/2023	07/28/2023	875.40	723	202.08.94.74.6586
1JWY-LKKQ-J7	1	Invoice	CREDIT 1 HD CLOTHING RACK	06/30/2023	07/30/2023	68.28	723	100.04.51.07.5704
1JYX-943X-9T	1	Invoice	ADMIN PRINTER TONER	06/30/2023	06/30/2023	26.50	623	100.02.20.01.5610
1KGW-PCTL-	1	Invoice	SWITCH GAME	06/27/2023	07/27/2023	39.88	723	100.05.71.03.5711
1KYD-K9YW-V	1	Invoice	MOTOROLA RADIOS	07/02/2023	08/01/2023	330.48	723	100.04.51.08.5415
1N6H-GWPT-9	3	Invoice	SOAP	06/23/2023	07/23/2023	7.44	723	100.05.71.00.5703
1N6H-GWPT-9	1	Invoice	PLASTIC LACE - 1ST LIB CARD PR	06/23/2023	07/23/2023	22.17	723	100.05.71.00.6062
1N6H-GWPT-9	2	Invoice	SHARPIE, PACKING TAPE, LAMINA	06/23/2023	07/23/2023	52.74	723	100.05.71.00.5701
1VLK-CTH4-33	1	Invoice	TALLY COUNTERS &TAPE	06/19/2023	07/19/2023	36.88	723	100.05.71.00.5701
1YJG-LLD9-91	1	Invoice	TRASH BAGS DOG PARK	06/28/2023	07/28/2023	61.53	623	202.08.94.74.6586
Total AMAZON CAPITAL SERVICES:						2,738.21		
AMERICAN BOLT CORP.								
910744	1	Invoice	NC HEX HD C/S NC FIN HEX NU	06/23/2023	07/23/2023	52.16	623	601.61.61.16.5411
Total AMERICAN BOLT CORP.:						52.16		
AQUAFIX INC								
IN008191	1	Invoice	275 GAL GREASEZILLA	06/23/2023	07/23/2023	8,895.85	623	601.61.61.16.5426
Total AQUAFIX INC:						8,895.85		
ARING EQUIPMENT CO., INC								
R49265	1	Invoice	ROAD WIDENER	06/20/2023	07/20/2023	1,500.00	623	100.04.51.07.5410
Total ARING EQUIPMENT CO., INC:						1,500.00		
AT&T								
0221159701	1	Invoice	MONTHLY PRI-	06/19/2023	07/19/2023	774.20	723	100.01.06.00.5601
Total AT&T:						774.20		
AT&T MOBILITY								
287325369680	2	Invoice	PD FIRSTNET PHONES	06/12/2023	07/07/2023	563.97	723	100.02.20.01.5604
287325369680	6	Invoice	HR PHONE	06/12/2023	07/07/2023	39.74	723	100.01.01.00.5601

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
287325369680	3	Invoice	IT FIRSTNET DEVICES	06/12/2023	07/07/2023	74.48	723	100.01.14.00.5601
287325369680	4	Invoice	UTILITY IPADS	06/12/2023	07/07/2023	451.62	723	605.56.09.21.5607
287325369680	1	Invoice	DPW IPADS	06/12/2023	07/07/2023	69.48	723	100.07.01.06.6502
287325369680	5	Invoice	SCADA LAPTOP	06/12/2023	07/07/2023	34.74	723	601.61.63.42.5606
Total AT&T MOBILITY:						1,234.03		
BAKER & TAYLOR COMPANY								
0003283835	1	Invoice	PRINT CREDIT	06/19/2023	07/19/2023	16.14-	723	100.05.71.01.5711
0003284044	1	Invoice	PRINT CREDIT	06/22/2023	07/22/2023	13.35-	723	100.05.71.01.5711
0003284240	1	Invoice	PRINT CREDIT	06/27/2023	07/27/2023	16.81-	723	100.05.71.01.5711
2037588857	1	Invoice	PRINT	06/08/2023	07/08/2023	1,533.45	723	100.05.71.01.5711
2037593477	1	Invoice	PRINT	06/12/2023	07/12/2023	367.68	723	100.05.71.01.5711
2037598005	1	Invoice	PRINT	06/13/2023	07/13/2023	254.65	723	100.05.71.01.5711
2037612332	1	Invoice	PRINT	06/20/2023	07/20/2023	478.47	723	100.05.71.01.5711
2037622431	1	Invoice	PRINT	06/28/2023	07/28/2023	548.80	723	100.05.71.01.5711
2037623179	1	Invoice	PRINT	06/28/2023	07/28/2023	755.15	723	100.05.71.01.5711
Total BAKER & TAYLOR COMPANY:						3,891.90		
BAKER & TAYLOR ENTERTAINMENT								
H65343580	1	Invoice	AV	06/10/2023	07/10/2023	267.10	723	100.05.71.02.5711
H65350760	1	Invoice	AV	06/12/2023	07/12/2023	28.79	723	100.05.71.02.5711
H65363350	1	Invoice	AV	06/13/2023	07/13/2023	203.66	723	100.05.71.02.5711
H65393630	1	Invoice	AV	06/20/2023	07/20/2023	79.16	723	100.05.71.02.5711
Total BAKER & TAYLOR ENTERTAINMENT:						578.71		
BAKER TILLY US, LLP								
BT2471663	4	Invoice	ADMIN CHARGE - 2022 AUDIT	06/29/2023	07/12/2023	260.00	623	100.01.06.00.5810
BT2471663	1	Invoice	PROGRESS BILLING #1 - 2022 AU	06/29/2023	07/12/2023	900.00	623	250.01.00.00.5810
BT2471663	2	Invoice	PROGRESS BILLING #4 - 2022 AU	06/29/2023	07/12/2023	7,000.00	623	100.01.06.00.5810
BT2471663	3	Invoice	GASB 87 - 2022 AUDIT	06/29/2023	07/12/2023	1,316.25	623	100.01.06.00.5810
Total BAKER TILLY US, LLP:						9,476.25		
BATTERIES PLUS LLC								
P63444366	1	Invoice	3.6V TITUS D CELL & 12V HIGH RA	06/21/2023	07/21/2023	209.86	623	601.61.63.42.5701
Total BATTERIES PLUS LLC:						209.86		
BOARD GAME BARRISTER, LTD								
1131009	1	Invoice	FOL KIDS - 6/14 BOARD GAME PR	06/22/2023	07/22/2023	200.00	723	100.05.71.00.5752
Total BOARD GAME BARRISTER, LTD:						200.00		
BOISITS, GERALD								
23.07.06	1	Invoice	BOR 2023	07/06/2023	07/21/2023	150.00	723	100.01.04.00.5802
Total BOISITS, GERALD:						150.00		
BSN SPORTS								
307132184	1	Invoice	OUTDOOR FLEX GOAL	06/16/2023	07/17/2023	524.97	623	100.04.51.11.5415
Total BSN SPORTS:						524.97		
BURMEISTER, GREG								
06262023	1	Invoice	LANDFILL MEETING 06/26/2023	06/27/2023	07/05/2023	50.00	723	207.01.00.00.6055

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
Total BURMEISTER, GREG:						50.00		
CDW GOVERNMENT INC								
KG1950	1	Invoice	AXIS CAMERA STATION 5.0 DEVIC	06/16/2023	07/16/2023	77.12	623	605.00.00.00.1960
KH10420	1	Invoice	AXIS T94T01D OUTDOOR PENDA	06/19/2023	07/19/2023	57.11	623	605.00.00.00.1960
Total CDW GOVERNMENT INC:						134.23		
CEDAR CREST SPECIALTIES								
0052317803	1	Invoice	IDLE ISLE ICE CREAM	06/27/2023	07/19/2023	216.12	723	100.05.72.19.5702
Total CEDAR CREST SPECIALTIES:						216.12		
CHAPPELL SPORTS								
22226	1	Invoice	SUMMER SPORTS SHIRTS KIDS P	06/20/2023	07/20/2023	247.50	723	100.05.72.13.5702
22226	2	Invoice	PICKLEBALL PROGRAM/STAFF SH	06/20/2023	07/20/2023	702.50	723	100.05.72.13.5702
22239	1	Invoice	PLAYGROUND CAMP STAFF/KIDS	07/02/2023	08/02/2023	1,197.00	723	100.05.72.16.5702
Total CHAPPELL SPORTS:						2,147.00		
CINTAS CORP								
PW 415994742	1	Invoice	MONTHLY UNIFORM CHARGES	06/28/2023	07/28/2023	481.25	623	100.04.51.07.5704
PW416054266	1	Invoice	COVERALLS & MATS	07/05/2023	08/04/2023	248.75	723	100.04.51.07.5704
UT 415994742	1	Invoice	MONTHLY UNIFORM CHARGES	06/29/2023	07/28/2023	175.49	623	605.56.09.21.5835
UT 415994742	2	Invoice	MONTHLY UNIFORM CHARGES	06/29/2023	07/28/2023	175.49	623	601.61.61.12.5702
UT4160542668	1	Invoice	COVERALLS & MATS	07/05/2023	08/04/2023	61.78	723	605.56.09.21.5835
UT4160542668	2	Invoice	COVERALLS & MATS	07/05/2023	08/04/2023	61.78	723	601.61.61.12.5702
Total CINTAS CORP:						1,204.54		
CIVIC SYSTEMS LLC								
CVC23556	2	Invoice	SEMI ANNUAL SUPPORT FEES	06/26/2023	07/12/2023	504.10	623	205.03.30.00.5704
CVC23556	3	Invoice	SEMI ANNUAL SUPPORT FEES	06/26/2023	07/12/2023	2,520.50	623	605.56.09.23.5510
CVC23556	4	Invoice	SEMI ANNUAL SUPPORT FEES	06/26/2023	07/12/2023	2,520.50	623	601.61.63.42.5509
CVC23556	5	Invoice	SEMI ANNUAL SUPPORT FEES	06/26/2023	07/12/2023	4,032.80	623	100.01.03.00.5506
CVC23556	1	Invoice	SEMI ANNUAL SUPPORT FEES	06/26/2023	07/12/2023	504.10	623	205.03.00.00.5702
Total CIVIC SYSTEMS LLC:						10,082.00		
COMPLETE OFFICE OF WIS								
445947	1	Invoice	TRASH LINERS	03/28/2023	04/28/2023	101.73	623	100.05.71.00.5703
Total COMPLETE OFFICE OF WIS:						101.73		
CONLEY MEDIA, LLC								
6404030623-2	1	Invoice	LIQUOR PUBLICATIONS	07/01/2023	07/01/2023	440.10	723	100.01.02.00.4243
6404030623-2	2	Invoice	1487/1491 NOTICES	07/01/2023	07/01/2023	54.20	723	100.01.06.00.6001
Total CONLEY MEDIA, LLC:						494.30		
CONSERV FS INC								
60058481	1	Invoice	50 SPECTRA LUBE RED	06/27/2023	07/27/2023	238.00	723	100.04.51.07.5735
Total CONSERV FS INC:						238.00		
CORE & MAIN LP								
T085554	1	Invoice	C44-45QNL 1X1-1/4 CPLG QJCTS	06/22/2023	07/22/2023	48.55	623	605.54.06.54.5702

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
T125320	1	Invoice	SCREW VLV BOX 24" SCREW VLV	06/29/2023	07/29/2023	1,291.30	723	605.54.06.51.5702
Total CORE & MAIN LP:						1,339.85		
EMERGENCY LIGHTING & ELECTRONICS								
220296	1	Invoice	SQD 4 REPAIRS	06/30/2023	06/30/2023	334.99	623	100.02.20.01.5405
Total EMERGENCY LIGHTING & ELECTRONICS:						334.99		
ENVIROTECH EQUIPMENT								
22-0020446	1	Invoice	IT PIPE SOFTWARE	06/28/2023	07/28/2023	38,500.00	623	601.00.00.00.1922
Total ENVIROTECH EQUIPMENT:						38,500.00		
EXCEL TOOL & FABRICATION INC								
20034	1	Invoice	PIER RAMP REPAIR	06/14/2023	07/14/2023	210.00	623	100.04.51.11.5415
Total EXCEL TOOL & FABRICATION INC:						210.00		
FASTENAL COMPANY								
WIMUK97635	1	Invoice	5/8"-11 S/S FHN S/S HCS 5/8-11X3	06/19/2023	07/19/2023	14.93	723	601.61.61.16.5411
Total FASTENAL COMPANY:						14.93		
FEH DESIGN								
113408	1	Invoice	FAMILY RESTROOM CONSTRUCTI	05/05/2023	06/05/2023	2,362.50	723	410.08.90.71.6515
113527	1	Invoice	FAMILY RESTROOM CONSTRUCTI	06/27/2023	07/27/2023	3,298.69	723	410.08.90.71.6515
Total FEH DESIGN:						5,661.19		
FERGUSON WATERWORKS #1476								
0374363-3	1	Invoice	LF 5/8X3/4 T10 MTR V4 R9000I US	06/15/2023	07/15/2023	6,527.27	623	605.00.00.00.1953
0381855	1	Invoice	REG 5/8 T10 V4 R900I REG 3/4 V	06/13/2023	07/13/2023	12,762.70	623	605.00.00.00.1953
0383546	1	Invoice	LFNP 3/4 VB222 HOSE BIBB VB	06/15/2023	07/15/2023	1,200.00	623	605.54.06.53.5702
0388052	1	Invoice	UPPER STEM OL F/F2500 HYD	06/15/2023	07/15/2023	978.60	623	605.54.06.54.5702
Total FERGUSON WATERWORKS #1476:						21,468.57		
FICKAU INC.								
84289	1	Invoice	5/8 X 3 STAINLESS BOLTS & NUTS	06/19/2023	07/19/2023	76.67	723	601.61.61.15.5415
Total FICKAU INC.:						76.67		
FRANKLIN AGGREGATES INC.								
1870078	1	Invoice	1 1/4 COMMERCIAL GRADE	06/22/2023	07/22/2023	700.26	623	100.04.51.02.5741
1870078	2	Invoice	1/2" CHIP	06/22/2023	07/22/2023	669.13	623	605.54.06.41.5702
Total FRANKLIN AGGREGATES INC.:						1,369.39		
GFL ENVIRONMENTAL								
U80000235948	2	Invoice	REFUSE	06/20/2023	07/20/2023	54,400.27	723	205.03.30.00.5820
U80000235948	3	Invoice	RECYCLING	06/20/2023	07/20/2023	43,880.10	723	205.03.00.00.5820
U80000235948	4	Invoice	YARD WASTE	06/20/2023	07/20/2023	1,271.50	723	205.03.00.00.6056
U80000235948	1	Invoice	TIPPING FEES	06/20/2023	07/20/2023	11,320.11	723	205.03.30.00.5820
Total GFL ENVIRONMENTAL:						110,871.98		

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
GLEASON REDI MIX								
322751	1	Invoice	6 BAG AIR & FUEL	06/19/2023	07/19/2023	536.55	623	100.04.51.04.5744
322868	1	Invoice	6 BAG AIR	06/21/2023	07/21/2023	144.00	623	100.04.51.04.5744
323195	1	Invoice	#1 SLURRY, FUEL CHARGE	06/28/2023	07/28/2023	902.00	723	605.54.06.51.5410
Total GLEASON REDI MIX:						1,582.55		
GRAEF INC								
0127189	1	Invoice	MUSKEGO LAKES ESTATES	06/21/2023	07/21/2023	3,871.22	723	507.00.00.00.2761
0127191	1	Invoice	PRESBYTERIAN HOMES	06/21/2023	07/21/2023	122.86	723	507.00.00.00.2768
0127194	1	Invoice	MALLARD POINTE DEVELOPMEN	06/21/2023	07/21/2023	268.75	723	507.00.00.00.2740
0127242	1	Invoice	COBBLESTONE COURT DEVELOP	06/23/2023	07/23/2023	2,818.54	723	507.00.00.00.2646
0127260	1	Invoice	KIRKLAND CROSSING DEVELOPM	06/26/2023	07/26/2023	1,463.75	723	507.00.00.00.2648
0127261	1	Invoice	NORTHCAPE STORAGE	06/26/2023	07/26/2023	38.75	723	507.00.00.00.2677
0127262	1	Invoice	BASELER HENNEBERRY DEVELO	06/26/2023	07/26/2023	4,932.50	723	507.00.00.00.2665
0127264	1	Invoice	COMMERCE CENTER WEST CAR	06/26/2023	07/26/2023	1,552.50	723	507.00.00.00.2735
0127265	1	Invoice	MHS ADDITION	06/26/2023	07/26/2023	290.00	723	507.00.00.00.2738
0127271	1	Invoice	BIOTECH	06/27/2023	07/27/2023	259.42	723	507.00.00.00.2707
0127276	1	Invoice	JILLY'S CAR WASH	06/27/2023	07/27/2023	2,983.35	723	507.00.00.00.2730
0127287	1	Invoice	HILLENDALE DRIVE	06/27/2023	07/27/2023	14,958.75	723	410.08.91.19.6507
0127289	1	Invoice	2023 ROAD PROGRAM	06/26/2023	07/26/2023	21,168.91	723	100.07.51.02.6502
0127290	1	Invoice	PEACH LANE	06/27/2023	07/27/2023	2,535.00	723	507.00.00.00.2760
0127298	1	Invoice	MUSKEGO STORAGE ADDITION	06/27/2023	07/27/2023	3,237.50	723	507.00.00.00.2748
0127299	1	Invoice	PJ'S TRUCKING	06/27/2023	07/27/2023	2,725.00	723	507.00.00.00.2779
0127303	1	Invoice	LANNON DRIVE BRIDGE	06/27/2023	07/27/2023	3,430.99	723	410.08.90.19.6511
0127407	1	Invoice	GENERAL ENGINEERING SEWER	06/30/2023	07/30/2023	2,262.50	723	601.61.63.43.5815
0127408	1	Invoice	GENERAL ENGINEERING SERVIC	06/30/2023	07/30/2023	3,632.35	723	100.04.19.00.5815
Total GRAEF INC:						72,552.64		
GRAINGER								
9753218792	1	Invoice	SPRING RETURN HOSE REEL	06/27/2023	07/27/2023	475.62	623	100.04.51.11.5415
Total GRAINGER:						475.62		
GUHR, LYNDA								
23.07.06	1	Invoice	BOR 2023	07/06/2023	07/21/2023	100.00	723	100.01.04.00.5802
Total GUHR, LYNDA:						100.00		
HALQUIST STONE COMPANY								
5555388-IN	1	Invoice	FIELDSTONE 3.27 TON	06/27/2023	07/27/2023	382.59	723	100.04.51.02.5741
Total HALQUIST STONE COMPANY:						382.59		
HARTLING TRUCKING LLC								
484	1	Invoice	233.09 STONE DELIVERY TO DPW	06/20/2023	07/20/2023	1,316.96	623	100.04.51.02.5741
Total HARTLING TRUCKING LLC:						1,316.96		
HEARTLAND BUSINESS SYSTEMS								
611426-H	4	Invoice	MONTHLY -365 .GOV/BUILDING	06/15/2023	07/15/2023	77.60	723	100.02.25.00.5506
611426-H	12	Invoice	MONTHLY -365 .GOV/MAYOR/MAI	06/15/2023	07/15/2023	13.70	723	100.01.06.00.5506
611426-H	8	Invoice	MONTHLY -365 .GOV/LIBRARY	06/15/2023	07/15/2023	121.30	723	100.05.71.00.5505
611426-H	5	Invoice	MONTHLY -365 .GOV/COURT	06/15/2023	07/15/2023	23.40	723	100.01.08.00.5504
611426-H	1	Invoice	MONTHLY -365 .GOV/IT/MISC	06/15/2023	07/15/2023	90.81	723	100.01.14.00.5507
611426-H	9	Invoice	MONTHLY -365 .GOV/REC	06/15/2023	07/15/2023	23.40	723	100.05.72.10.5506
611426-H	6	Invoice	MONTHLY -365 .GOV/FINANCE	06/15/2023	07/15/2023	67.90	723	100.01.03.00.5502

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
611426-H	2	Invoice	MONTHLY -365 .GOV/LAW	06/15/2023	07/15/2023	19.40	723	100.01.05.00.5701
611426-H	10	Invoice	MONTHLY -365 .GOV/PW	06/15/2023	07/15/2023	151.00	723	100.04.51.01.5506
611426-H	7	Invoice	MONTHLY -365 .GOV/HR	06/15/2023	07/15/2023	9.70	723	100.01.06.00.5506
611426-H	3	Invoice	MONTHLY -365 .GOV/POLICE	06/15/2023	07/15/2023	392.22	723	100.02.20.01.5504
611426-H	11	Invoice	MONTHLY -365 .GOV/ASSESSOR	06/15/2023	07/15/2023	9.70	723	100.01.04.00.5503
Total HEARTLAND BUSINESS SYSTEMS:						1,000.13		
HUMPHREY SERVICE PARTS								
01P111389	1	Invoice	3030 PIGGY BACK KIT	06/15/2023	07/15/2023	129.44	723	100.04.51.07.5405
01P112299	1	Invoice	PANIT STRIPPER PARTS	06/28/2023	07/28/2023	478.65	723	100.04.51.07.5405
01P112393	1	Invoice	C/T CLAMP	06/29/2023	07/29/2023	27.99	723	100.04.51.07.5405
Total HUMPHREY SERVICE PARTS:						636.08		
HYDROCORP								
0072976-IN	1	Invoice	CROSS CONNECTION CONTROL	06/30/2023	07/30/2023	1,078.00	723	605.56.09.23.5815
Total HYDROCORP:						1,078.00		
JANI-KING INC- MILW REGION								
MIL07230094	7	Invoice	UT-WATER/MERCURY	07/01/2023	07/31/2023	179.95	723	605.56.09.23.5810
MIL07230094	5	Invoice	DPW/MERCURY	07/01/2023	07/31/2023	448.88	723	100.04.51.08.5415
MIL07230094	1	Invoice	CITY HALL	07/01/2023	07/31/2023	2,464.25	723	100.01.09.00.5835
MIL07230094	9	Invoice	UT-SEWER/APOLLO	07/01/2023	07/31/2023	72.30	723	601.61.61.15.5415
MIL07230094	6	Invoice	UT-SEWER/MERCURY	07/01/2023	07/31/2023	179.95	723	601.61.61.15.5415
MIL07230094	2	Invoice	POLICE	07/01/2023	07/31/2023	2,562.65	723	100.02.20.01.5835
MIL07230094	3	Invoice	LIBRARY	07/01/2023	07/31/2023	3,203.32	723	100.05.71.00.5835
MIL07230094	8	Invoice	DPW/APOLLO	07/01/2023	07/31/2023	180.35	723	100.04.51.08.5415
MIL07230094	4	Invoice	OLD TOWN HALL	07/01/2023	07/31/2023	390.55	723	100.04.51.11.5820
MIL07230094	10	Invoice	UT-WATER/APOLLO	07/01/2023	07/31/2023	72.30	723	605.56.09.23.5815
MIL07230616	1	Invoice	JULY PARK CLEANING	07/01/2023	07/31/2023	2,050.00	723	100.04.51.11.5820
MIL07230632	1	Invoice	CITY HALL	07/05/2023	07/31/2023	16.60-	723	100.01.09.00.5835
MIL07230633	1	Invoice	CITY HALL	07/05/2023	07/31/2023	73.00-	723	100.01.09.00.5835
Total JANI-KING INC- MILW REGION:						11,714.90		
JOHNNY'S PETROLEUM PROD INC								
43948 43949	1	Invoice	#2 ULSC DIESEL 2000 GALS	06/22/2023	07/22/2023	6,914.60	623	100.04.51.07.5736
43948 43949	2	Invoice	RFG E-10 6300 GALS	06/22/2023	07/22/2023	21,924.00	623	100.04.51.07.5736
Total JOHNNY'S PETROLEUM PROD INC:						28,838.60		
JSA ENVIRONMENTAL INC.								
3012	1	Invoice	LANDFILL AUDIT JUNE 2023	07/01/2023	07/15/2023	3,447.96	723	210.03.00.00.5816
Total JSA ENVIRONMENTAL INC.:						3,447.96		
KEIL, JEREMY								
23.07.06	1	Invoice	BOR 2023	07/06/2023	07/21/2023	150.00	723	100.01.04.00.5802
Total KEIL, JEREMY:						150.00		
KIESLER'S POLICE SUPPLY INC								
IN217336	1	Invoice	OPTICS EQUIPMENT	06/30/2023	06/30/2023	199.11	623	100.02.20.01.5301
Total KIESLER'S POLICE SUPPLY INC:						199.11		

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
LAKELAND SUPPLY, INC.								
222350	1	Invoice	OTH PAPERTOWELS	06/29/2023	07/05/2023	686.00	723	100.04.51.08.5415
Total LAKELAND SUPPLY, INC.:						686.00		
LANG'S								
176764	1	Invoice	CHOC BROWN MULCH	06/27/2023	07/27/2023	420.00	623	601.61.61.15.5415
Total LANG'S:						420.00		
LAWSON PRODUCTS INC.								
9310689350	1	Invoice	MINI LEVER HOIST ORANGE PAIN	06/13/2023	07/13/2023	275.19	623	100.04.51.07.5405
Total LAWSON PRODUCTS INC.:						275.19		
LEAGUE OF WISC MUNICIPALITIES								
85794	1	Invoice	URBAN ALLIANCE	05/01/2023	07/03/2023	25.00	723	100.01.01.00.5303
Total LEAGUE OF WISC MUNICIPALITIES:						25.00		
LUANN LANG								
06282023	1	Invoice	BLOOD DRIVE REIMBURSEMENT	06/28/2023	07/12/2023	39.51	623	100.03.22.00.5704
Total LUANN LANG:						39.51		
MACQUEEN EQUIPMENT								
P16554	1	Invoice	2400 PSI USED CY	06/15/2023	07/14/2023	435.00	623	601.61.61.15.5425
Total MACQUEEN EQUIPMENT:						435.00		
MENARDS								
41096	1	Invoice	4" EXT DECK STAR DRIVE 5/16 S	06/12/2023	07/12/2023	44.38	623	100.04.51.11.5415
41254	1	Invoice	1X4-10' QUALITY BOARD	06/15/2023	07/15/2023	68.56	623	100.04.51.11.5415
41262	1	Invoice	4X8 RTD SHTG BLACK STRIPES	06/15/2023	07/15/2023	130.72	623	100.04.51.11.5415
41637	1	Invoice	2X4-8 STUD 2X4-12	06/22/2023	07/22/2023	49.73	623	100.04.51.11.5415
Total MENARDS:						293.39		
MICROMARKETING LLC								
925213	1	Invoice	AV	06/20/2023	07/20/2023	40.00	723	100.05.71.02.5711
Total MICROMARKETING LLC:						40.00		
MIDWEST TAPE								
503955658	1	Invoice	AV	06/19/2023	07/19/2023	48.73	723	100.05.71.02.5711
503972544	1	Invoice	AV	06/23/2023	07/23/2023	115.45	723	100.05.71.02.5711
503972545	1	Invoice	AV	06/23/2023	07/23/2023	426.90	723	100.05.71.02.5711
504012365	1	Invoice	HOPLA USAGE 06 23	07/01/2023	08/01/2023	804.84	723	100.05.71.03.5711
Total MIDWEST TAPE:						1,395.92		
MISS BECKY LLC								
803	1	Invoice	CLASS INSTRUCTION CHEER CA	06/27/2023	07/27/2023	330.00	723	100.05.72.13.5110
Total MISS BECKY LLC:						330.00		
MURRAY, PATRICK								
06262023	1	Invoice	LANDFILL MEETING 06/26/2023	06/27/2023	07/05/2023	50.00	723	207.01.00.00.6055

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
Total MURRAY, PATRICK:						50.00		
MUSKEGO FEED & SEED								
000177	1	Invoice	MEC AMINE D 2.5 GAL	07/03/2023	07/17/2023	674.87	723	100.04.51.04.5744
Total MUSKEGO FEED & SEED:						674.87		
MUSKEGO GIRLS STORM								
17916	1	Invoice	REFUND FOR CANCELLED GIRLS	07/03/2023	02/18/3203	850.00	723	100.05.72.02.4317
Total MUSKEGO GIRLS STORM:						850.00		
OLSEN SAFETY EQUIPMENT CORP.								
0407923-IN	1	Invoice	MENS SAFETY CUFF GLOVES ST	06/23/2023	07/23/2023	161.12	623	601.61.61.15.5425
Total OLSEN SAFETY EQUIPMENT CORP.:						161.12		
OLSONS OUTDOOR POWER								
200990	1	Invoice	GATOR G6 60" LINE 2.4MM DARK	06/28/2023	07/28/2023	1,000.52	723	100.04.51.11.5405
Total OLSONS OUTDOOR POWER:						1,000.52		
PACKER FASTENER								
IN5110	1	Invoice	FLANGE BOLTS	06/16/2023	07/16/2023	56.33	623	100.04.51.07.5405
IN6351	1	Invoice	FLANGE BOLT	06/20/2023	07/20/2023	10.72	623	100.04.51.07.5405
IN8162	1	Invoice	ELECTRICAL TAPE DUCT TAPE S	06/27/2023	07/27/2023	116.15	723	100.04.51.11.5415
IN8618	1	Invoice	USS FLAT WASHER 5/16 & 3/8 FE	06/28/2023	07/28/2023	21.09	723	100.04.51.07.5405
Total PACKER FASTENER:						204.29		
PAYNE & DOLAN OF WISCONSIN								
1871062	1	Invoice	4.99 TONS COMMERCIAL 9.5MM	06/23/2023	07/23/2023	341.32	623	100.04.51.02.5740
1871063	1	Invoice	3.49 TN COMMERCIAL 12.5 MM	06/23/2023	07/23/2023	219.70	623	100.04.51.02.5740
Total PAYNE & DOLAN OF WISCONSIN:						561.02		
PIGGLY WIGGLY								
JUVCC	1	Invoice	RESTITUTION FROM JUVENILE C	06/26/2023	07/26/2023	31.59	623	100.01.08.00.4269
Total PIGGLY WIGGLY:						31.59		
POSBRIG, HENRY								
23.07.06	1	Invoice	BOR 2023	07/01/2023	07/21/2023	50.00	723	100.01.04.00.5802
Total POSBRIG, HENRY:						50.00		
PROVEN POWER INC								
02-433412	1	Invoice	JD SPINDLE	06/29/2023	07/29/2023	200.75	723	100.04.51.11.5405
02-433413	1	Invoice	JD AIR FILTER	06/29/2023	07/29/2023	17.30	723	100.04.51.11.5405
Total PROVEN POWER INC:						218.05		
QUALITY AWARDS LLC								
32184	1	Invoice	NAME TAG - EMMA	04/21/2023	05/06/2023	13.50	723	100.05.71.00.5701
Total QUALITY AWARDS LLC:						13.50		

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
RELIANCE STANDARD LIFE INS CO								
VPL302974/JU	1	Invoice	LONG TERM DISABILITY	06/27/2023	07/27/2023	512.08	723	100.00.00.00.2246
Total RELIANCE STANDARD LIFE INS CO:						512.08		
RETURN TO NATIVE PRAIRIE SERVICES								
437	1	Invoice	TREATED TEASEL AT ENGEL	07/01/2023	07/01/2023	480.00	723	215.06.00.00.6008
Total RETURN TO NATIVE PRAIRIE SERVICES:						480.00		
ROZMAN TRUE VALUE/CH								
120202	1	Invoice	RUBBER MAX HOSE	06/08/2023	07/05/2023	60.99	723	100.01.09.00.5415
Total ROZMAN TRUE VALUE/CH:						60.99		
ROZMAN TRUE VALUE/PD								
120270	1	Invoice	BATTERY	06/30/2023	06/30/2023	5.99	623	100.02.20.01.5722
Total ROZMAN TRUE VALUE/PD:						5.99		
ROZMAN TRUE VALUE/PW								
22000 JUNE 2	1	Invoice	PARKS	06/25/2023	07/20/2023	295.33	623	100.04.51.11.5415
22000 JUNE 2	2	Invoice	MISC TOOLS/PARTS	06/25/2023	07/20/2023	108.36	623	100.04.51.04.5744
Total ROZMAN TRUE VALUE/PW:						403.69		
ROZMAN TRUE VALUE/UT								
25000 JUNE 2	4	Invoice	4X10 CELL CORE PVC PIPE COU	06/26/2023	07/20/2023	121.94	623	605.00.00.00.1960
25000 JUNE 2	1	Invoice	TWIST KNOT WHL BRUSH	06/26/2023	07/20/2023	31.99	623	605.54.06.54.5702
25000 JUNE 2	5	Invoice	BRAID TUBING PVC PIPE COUPL	06/26/2023	07/20/2023	96.04	623	601.61.61.16.5411
25000 JUNE 2	2	Invoice	WHT 80UT PROTECTOR	06/26/2023	07/20/2023	34.99	623	605.56.09.21.5712
25000 JUNE 2	6	Invoice	GATE VALVE RED BRS NIPPLES E	06/26/2023	07/20/2023	37.96	623	605.52.06.25.5702
25000 JUNE 2	3	Invoice	SCREWDRIVERS BLK P;AS ELEC	06/26/2023	07/20/2023	125.89	623	601.61.61.15.5415
Total ROZMAN TRUE VALUE/UT:						448.81		
SAFEWAY PEST MANAGEMENT INC.								
710401	1	Invoice	PEST CONTROL CH	06/21/2023	07/21/2023	40.00	723	100.01.09.00.5415
710843	1	Invoice	PEST CONTROL NEW PD	06/21/2023	07/21/2023	45.00	723	100.02.20.01.5415
711134	1	Invoice	PEST CONTROL OLD TOWN HALL	06/28/2023	07/28/2023	70.00	723	100.04.51.11.5820
Total SAFEWAY PEST MANAGEMENT INC.:						155.00		
SCHWEITZER, HARVEY								
06262023	1	Invoice	LANDFILL MEETING 06/26/2023	06/27/2023	07/05/2023	50.00	723	207.01.00.00.6055
Total SCHWEITZER, HARVEY:						50.00		
SERVICE SANITATION WISCONSIN INC								
8654329/30/31/	1	Invoice	PORTABLE TOILETS JULY BOAT L	07/01/2023	08/01/2023	356.00	723	100.04.51.11.5820
8654335/36	1	Invoice	PORTABLE TOLIETS JULY CONSE	07/01/2023	08/01/2023	178.00	723	215.06.00.00.5801
8654337/38/39/	1	Invoice	PORTABLE TOLIETS JULY PARKS	07/01/2023	08/01/2023	569.00	723	100.04.51.11.5820
Total SERVICE SANITATION WISCONSIN INC:						1,103.00		
SHERWIN INDUSTRIES, INC.								
SC050675	1	Invoice	FIBER MIX BULK	06/30/2023	07/30/2023	2,851.86	723	100.04.51.02.5740

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
Total SHERWIN INDUSTRIES, INC.:						2,851.86		
SIEMENS INDUSTRY INC.								
5330918535	1	Invoice	ANNUNCIATOR MIC ISSUES	05/28/2023	05/28/2023	1,549.00	723	100.01.09.00.5415
Total SIEMENS INDUSTRY INC.:						1,549.00		
SJE								
CD99485246	1	Invoice	GASKET 3 HYD VOLUTE GROOV	06/22/2023	07/22/2023	3,099.31	623	601.61.61.16.5411
CD99485973	1	Invoice	SOLID GLAND 210 FRAME O-RIN	06/28/2023	07/28/2023	2,327.06	623	601.61.61.16.5411
Total SJE:						5,426.37		
SPECTRUM								
015213606232	1	Invoice	911 LINE	06/23/2023	07/10/2023	235.92	723	100.02.20.01.5604
Total SPECTRUM:						235.92		
SPRING, MARA								
23.07.06	1	Invoice	BOR 2023	07/06/2023	07/21/2023	100.00	723	100.01.04.00.5802
Total SPRING, MARA:						100.00		
STATE OF WISC COURT FINES & SURCHARGES								
WIJUN2023	1	Invoice	COURT FEES	06/30/2023	07/30/2023	7,663.76	623	100.01.08.00.4269
Total STATE OF WISC COURT FINES & SURCHARGES:						7,663.76		
SUPERIOR CHEMICAL								
366957	1	Invoice	AERO FRESH-SUN BURST AERO	06/28/2023	07/28/2023	352.58	623	100.04.51.11.5415
366994	1	Invoice	WASP & HORNET SPRAY	06/28/2023	07/28/2023	310.19	623	100.04.51.11.5702
Total SUPERIOR CHEMICAL:						662.77		
TAPCO INC.								
I756762	1	Invoice	STAINLESS STEEL STRAPPING S	06/27/2023	07/28/2023	455.39	623	100.04.51.03.5743
Total TAPCO INC.:						455.39		
TOWN OF NORWAY								
TN-06302023	1	Invoice	2ND QUARTER SEWER CHARGES	07/03/2023	07/12/2023	56,581.67	623	601.61.61.10.6068
Total TOWN OF NORWAY:						56,581.67		
TRIEBOLD OUTDOOR POWER LLC								
IC49702	1	Invoice	WINDSHIELD WEATHER SEAL RU	06/16/2023	07/16/2023	133.75	623	100.04.51.11.5405
Total TRIEBOLD OUTDOOR POWER LLC:						133.75		
TYLER TECHNOLOGIES INC								
060-114508	1	Invoice	ASSESSOR SERVICES - MAY	06/09/2023	07/12/2023	6,326.90	623	100.01.04.00.5801
Total TYLER TECHNOLOGIES INC:						6,326.90		
UNIVERSAL PRINTING SOLUTIONS INC								
257471	1	Invoice	TONER	06/13/2023	07/19/2023	308.45	723	100.01.14.00.5506

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
Total UNIVERSAL PRINTING SOLUTIONS INC:						308.45		
USA BLUE BOOK								
INV00038529	1	Invoice	FLAGS BLUE & GREEN	06/09/2023	07/09/2023	265.71	623	605.54.06.41.5870
INV00046793	1	Invoice	T LIFT MANHOLE COVER LIFTER	06/16/2023	07/16/2023	503.33	623	601.61.61.15.5425
INV00055163	1	Invoice	STRAIGHT METER COUPLING B	06/26/2023	07/26/2023	383.87	623	605.54.06.54.5702
Total USA BLUE BOOK:						1,152.91		
VON BRIESEN & ROPER S.C.								
428857	1	Invoice	PROF SVCS-PERSONNEL	06/20/2023	07/20/2023	2,860.00	723	100.01.05.00.5805
428858	1	Invoice	PROF SVCS - BARGAINING	06/20/2023	07/20/2023	2,458.38	723	100.01.05.00.5805
428859	1	Invoice	PROF SVCS - GENERAL	06/20/2023	07/20/2023	162.50	723	100.01.05.00.5805
Total VON BRIESEN & ROPER S.C.:						5,480.88		
WAL-MART								
1649329095	4	Invoice	TENNIS LESSON EQUIPMENT	06/19/2023	07/14/2023	75.52	723	100.05.72.13.5702
1649329095	5	Invoice	FINANCE CHARGE - LATE PAYME	06/19/2023	07/14/2023	9.52	723	100.05.72.10.5701
1649329095	1	Invoice	CONCESSIONS @ IDLE ISLE	06/19/2023	07/14/2023	451.32	723	100.05.72.19.5702
1649329095	2	Invoice	PLAYGROUND EQUIPMENT/SUPP	06/19/2023	07/14/2023	314.31	723	100.05.72.16.5702
1649329095	3	Invoice	FISHING CLUB	06/19/2023	07/14/2023	16.23	723	100.05.72.13.5702
Total WAL-MART:						866.90		
WARRIOR WASH LLC								
warriorwashma	1	Invoice	SQUAD WASHES	06/30/2023	06/30/2023	156.00	623	100.02.20.01.5405
Total WARRIOR WASH LLC:						156.00		
WAUKESHA COUNTY TREASURER								
2233996003	1	Invoice	MSKC2233.996.003 22 TAX SLAK	06/27/2023	07/27/2023	6,813.00	723	501.00.00.00.1201
2255978	1	Invoice	MSKC2255978 2022 TAX	06/27/2023	07/27/2023	1,937.00	723	501.00.00.00.1201
WAJUN2023	1	Invoice	COURT SURCHARGES	06/30/2023	07/30/2023	1,695.20	623	100.01.08.00.4269
Total WAUKESHA COUNTY TREASURER:						10,445.20		
WCA GROUP HEALTH TRUST								
0014603673	1	Invoice	GROUP HEALTH INSURANCE JUL	07/01/2023	07/27/2023	188,197.28	723	100.00.00.00.2206
Total WCA GROUP HEALTH TRUST:						188,197.28		
WE ENERGIES								
4612484948	1	Invoice	STREET LIGHTING (00120)	06/08/2023	06/30/2023	5,925.41	623	100.04.51.06.5910
4616064650	1	Invoice	PARKS DEPARTMENT (00123)	06/12/2023	07/05/2023	1,523.27	623	100.04.51.11.5910
4617853754	1	Invoice	PARKS DEPARTMENT (00123)	06/13/2023	07/05/2023	132.48	623	100.04.51.11.5910
4638260276	1	Invoice	LS GROUP - SEWER (00119)	06/28/2023	07/20/2023	1,016.05	723	601.61.61.20.5910
4638262825	1	Invoice	RANGE ELECTRICITY (00122)	06/28/2023	07/20/2023	55.98	723	100.02.20.01.6023
4641481196	1	Invoice	LS GROUP - SEWER (00001)	06/30/2023	07/24/2023	13,407.03	723	601.61.61.20.5910
4641481284	4	Invoice	SEWER - 25% (00004)	06/27/2023	07/24/2023	9.66	723	601.61.61.20.5910
4641481284	5	Invoice	WATER - 25% (00004)	06/27/2023	07/24/2023	9.66	723	605.56.09.21.5910
4641481284	2	Invoice	CH - 47% (00004)	06/27/2023	07/24/2023	313.46	723	100.01.09.00.5910
4641481284	3	Invoice	GARAGE - 50% (00004)	06/27/2023	07/24/2023	19.30	723	100.04.51.08.5910
4641481284	1	Invoice	PD - 53% (00004)	06/27/2023	07/24/2023	277.98	723	100.02.20.01.5910
4641482890	1	Invoice	PD - 53% (00003)	06/27/2023	07/24/2023	4,203.20	723	100.02.20.01.5910
4641482890	5	Invoice	WATER - 25% (00003)	06/27/2023	07/24/2023	627.21	723	605.56.09.21.5910
4641482890	3	Invoice	GARAGE - 50% (00003)	06/27/2023	07/24/2023	1,254.40	723	100.04.51.08.5910

Invoice Number	SeqNo	Type	Description	Invoice Date	Payment Due Date	Total Cost	GL Period	GL Account Number
4641482890	2	Invoice	CH - 47% (00003)	06/27/2023	07/24/2023	4,739.78	723	100.01.09.00.5910
4641482890	4	Invoice	SEWER - 25% (00003)	06/27/2023	07/24/2023	627.21	723	601.61.61.20.5910
4641484962	2	Invoice	AREA LIGHTING (00118)	06/28/2023	07/24/2023	122.10	723	100.04.51.11.5910
4641484962	1	Invoice	LIBRARY (00118)	06/28/2023	07/24/2023	6,699.57	723	100.05.71.00.5910
4641484962	3	Invoice	HIST TOWN HALL (00118)	06/28/2023	07/24/2023	282.18	723	100.04.51.11.5910
46432722491	1	Invoice	GAS/ELEC FOR WELLS/PUMPS (0	07/03/2023	07/25/2023	10,002.79	723	605.52.06.22.5910
Total WE ENERGIES:						51,248.72		
WHITE CAP L.P.								
10018221944	1	Invoice	24" STANDARD WALL COLUMN FO	06/15/2023	07/15/2023	162.88	623	100.04.51.11.5415
Total WHITE CAP L.P.:						162.88		
WIND LAKE AUTO PARTS								
1975 JUNE 23	4	Invoice	TAPERED ROLLER OIL FILTER RT	06/30/2023	07/30/2023	471.82	723	100.04.51.11.5405
1975 JUNE 23	5	Invoice	BATTERIES HYD OIL FILTER GLO	06/30/2023	07/30/2023	636.18	723	100.04.51.07.5405
1975 JUNE 23	1	Invoice	CREDIT	06/30/2023	07/30/2023	9.98-	723	100.04.51.07.5405
1975 JUNE 23	2	Invoice	INT FLOOR MAT	06/30/2023	07/30/2023	269.95	723	601.61.61.21.5306
1975 JUNE 23	3	Invoice	OIL FILTERS TPMS SENSOR THE	06/30/2023	07/30/2023	152.42	723	100.02.20.01.5405
Total WIND LAKE AUTO PARTS:						1,520.39		
WISC DEPT OF ADMINISTRATION								
505-00000796	1	Invoice	ANNUAL SPAM FILITING- STATE O	05/10/2023	06/09/2023	70.50	723	100.01.14.00.5507
505-00000810	1	Invoice	ANNUAL SPAM FILITING- STATE O	06/13/2023	07/13/2023	70.50	723	100.01.14.00.5507
Total WISC DEPT OF ADMINISTRATION:						141.00		
WISC DEPT OF JUSTICE - CIB								
L6806T/JUNE2	1	Invoice	BACKGROUND CHECK	07/05/2023	07/31/2023	567.00	723	100.01.06.00.6002
Total WISC DEPT OF JUSTICE - CIB:						567.00		
WOODLAND RESTORATION LLC								
20230625-003	1	Invoice	DENOON & ENGEL	06/25/2023	07/05/2023	329.50	723	215.06.00.00.6008
Total WOODLAND RESTORATION LLC:						329.50		
XPERIENCE ELECTRIC, LLC								
ELECCROWB	1	Invoice	REFUND W220S7715 CROWBAR R	07/05/2023	07/05/2023	60.00	723	100.02.25.00.4250
ELECELEANO	1	Invoice	REFUND S77W22180 ELEANOR (V	07/05/2023	07/05/2023	60.00	723	100.02.25.00.4250
Total XPERIENCE ELECTRIC, LLC:						120.00		
Grand Totals:						702,024.80		

<u>Invoice Number</u>	<u>SeqNo</u>	<u>Type</u>	<u>Description</u>	<u>Invoice Date</u>	<u>Payment Due Date</u>	<u>Total Cost</u>	<u>GL Period</u>	<u>GL Account Number</u>
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Report Criteria:
Detail report.
Invoices with totals above \$0 included.
Paid and unpaid invoices included.
[Report].Description = {<>} "1099 adjustment"
