



**Request for Bids
for the
Purchase & Installation of a Bulk Waste Compactor & Conveyor
at the Morse Road Transfer Station**

Project No. 6010

Advertised..... March 17, 2025
Mandatory In-Person Pre-Bid Meeting..... March 21, 2025
Site Visits..... April 3, 2025
Deadline for questions or clarification 4:00 p.m., April 4, 2025
Bids due 2:00 p.m., April 11, 2025
Potential award timeframe..... May 2025

Project Manager

Wes Jordan, Facilities Manager

Board of Trustees

Susan Tilgner, Chair
Kathy Owens, Vice Chair
Commissioner Erica Crawley
Ron Grossman
Patrick King
Jennie McAdams
Stephen Sayre
Randy Sokol
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Public Notice

The Solid Waste Authority of Central Ohio (SWACO) is accepting sealed bids from qualified suppliers for the purchase and installation of a Compactor at the Morse Road Transfer Station. A mandatory virtual pre-bid meeting is scheduled for 3:00 p.m. (EST), on March 21, 2025. Do Business With Us and register to download the RFB documents by visiting www.swaco.org/Bids.aspx. Bids for this Project must be received by SWACO no later than 2:00 p.m. (EST) April 11, 2025. Contact SWACO Procurement in writing only at procurement@swaco.org for questions concerning this RFB. No phone calls please. SWACO reserves the right to reject any and all Bids and to waive minor irregularities or informalities in the selection process.

Advertised in *The Columbus Dispatch* on Monday, March 17, 2025

I. General Information

A. SWACO. The Solid Waste Authority of Central Ohio (“SWACO”) is a regional solid waste authority established in accordance with Ohio Revised Code Section 343.011. SWACO was created in 1989 in response to Substitute House Bill 592 (“HB 592”) to develop and implement a comprehensive solid waste management plan for the Franklin County Solid Waste Management District, which is comprised principally of Franklin County but includes parts of five (5) adjacent counties (collectively the “District”).

As a political subdivision of the State of Ohio, SWACO operates a Subtitle D sanitary landfill with an allowable maximum daily capacity of eight thousand (8,000) tons and two (2) waste transfer stations with a combined capacity of approximately two thousand (2,000) tons per day. SWACO owns and/or leases multiple facilities and operates on an estimated fifty-one million dollars (\$51,000,000) of annual revenue and twenty-five million (\$25,000,000) of SWACO’s EPA Trust Fund.

SWACO employs approximately one hundred thirty-five (135) full-time staff who work under four (4) major organizational functions: Administration, Operations, Legal Affairs, and Innovation & Programs. SWACO also provides programs aimed at reducing the generation and disposal of solid waste within SWACO’s District. These programs include public education and awareness, yard waste composting, and other waste-reduction activities. SWACO is also responsible for maintenance activities at a closed landfill. Total solid waste generation within SWACO’s District exceeds one million tons (1,000,000) per year.

B. Board of Trustees. A nine (9)-member Board of Trustees (“Board”) governs SWACO. Pursuant to Ohio Revised Code Section 343.011 and SWACO’s bylaws, the Mayor of the City of Columbus and the Franklin County Board of Commissioners each appoint two (2) members to the Board. Other members include one (1) designee of the Franklin County Health Commissioner, one (1) designee of Franklin County’s Township Trustees, and three (3) members appointed by the Board representing the public, general interest of the citizens, and the industrial, commercial, or institutional generators of solid wastes within the District. The Board appoints SWACO’s Executive Director, who serves to direct the daily operations and functions of SWACO as SWACO’s Chief Executive Officer.

II. The Project

A. Project Description. The Project generally consists of the purchase and installation of a bulk waste compactor and material conveyor in the Morse Road Transfer Station (MRTS), in Columbus, Ohio. SWACO is concurrently advertising an RFB for the MRTS Improvements Project. The equipment will be installed after the MRTS Improvements Project has been completed. The duration of construction is for an approximately one (1)-year contract per project milestones.

B. Project Objective. SWACO is seeking qualified Bidders that can complete the work as described in the RFB Documents. Work on this Project will need to be coordinated with the MRTS Improvements’ contractor to ensure all foundations and utilities installed are to the compactor and conveyor manufacturer’s requirements.

C. Additional Information. Project information, attached hereto as **Exhibit A** and made part of this RFB, provides additional details and miscellaneous information relating to the Successful Bidder and the Project. There are two (2) supplemental specification sections included with Exhibit A.

D. Required Forms and Documents. Section III, Subsection C, provides a list of Required Forms, attached hereto as **Exhibit B**, and a list of Required Documents to be provided by Bidder for this RFB.

1. All Required Forms (Exhibit B) are to be filled out in their entirety, notarized where applicable, and included with the Bid submission. Please be sure to include any needed documentation for the *Acknowledgment* form.

2. Bidder must also provide a *Bidder's Statement*, *Bid Guaranty*, and *Consent of Surety* (as applicable) with their Bid submission. Section III, Subsection C, provides an explanation for each document.

3. Bids must be submitted on the Bid Sheet provided in **Exhibit B**. A spreadsheet of the Bid Tab is available for download as a separate attachment for Bidders to use.

E. Exceptions to RFB. Any exceptions to this RFB will be considered and included in SWACO's analysis. If the Bidder fails to list any exceptions, SWACO will assume compliance with the terms, conditions, and requirements of the RFB, including the Sample Contract, and Bidder shall not raise any exceptions later if selected for award. Please see Exhibit B, Required Forms and Documents, for the *RFB Exceptions* Form.

F. Sample Contract. A sample contract is provided, attached hereto as **Exhibit C**, setting forth the proposed terms, conditions, provisions and/or specifications, which shall govern the relationship of SWACO and the Successful Bidder, if any, upon the award of a contract for the Project.

G. Project Documents. Documents that may also be included with the Contract are SWACO's General Conditions, attached hereto as **Exhibit D**, MRTS Improvements Project Specifications, attached hereto as **Exhibit E**, MRTS Improvements Project Construction Plans (included as a separate downloadable document), included as **Exhibit F**, and Prevailing Wages, attached hereto as **Exhibit G**.

H. Times. All times set forth in this RFB are listed at Grove City, Ohio local time, which is Eastern Standard Time (EST).

I. Mandatory Pre-Bid Meeting. A virtual and in-person pre-bid meeting is scheduled on March 21, 2025, at 3:00 p.m.. **All Bidders are required to attend the pre-bid meeting.** Please see the information below to attend the pre-bid meeting either virtually or in person.

In-Person Pre-Bid Meeting

RFB Morse Road Transfer Station Compactor Project
March 21, 2025, at 3:00 p.m. (EST)

Location:

Solid Waste Authority of Central Ohio (SWACO)
Morse Road Transfer Station
4262 Morse Road
Columbus, Ohio 43230

Mandatory Virtual Pre-Bid Meeting

RFB Morse Road Transfer Station Compactor Project

March 21, 2025, at 3:00 p.m. (EST)

Microsoft Teams

[Join the meeting now](#)

Meeting ID: 271 148 952 465

Passcode: ic2bM2tR

Dial in by phone

[+1 513-301-2202,,29421989#](#) United States, Cincinnati

[Find a local number](#)

Phone conference ID: 294 219 89#

For organizers: [Meeting options](#) | [Reset dial-in PIN](#)

J. Site Visits. Site visits are encouraged and can be scheduled by emailing Mr. Wes Jordan at wes.jordan@swaco.org. Site visits must be completed prior to April 3, 2025

K. Timeline of Events. The Public Notice for this Project was posted on Monday, March 17, 2025. Bid Documents are available on SWACO's website (www.swaco.org/Bids.aspx) through 1:30 p.m., April 11, 2025.

Dates listed below show the timeline of this RFB. Deadlines for pre-bid meetings, site visits, questions, when bids are due, and awards are shown. Please note that all dates listed below may be altered at SWACO's sole and complete discretion.

Advertised	March 17, 2025
Mandatory In-Person Pre-Bid Meeting	March 21, 2025
Site Visits	April 3, 2025
Deadline for questions or clarification	4:00 p.m., April 4, 2025
Bids due	2:00 p.m., April 11, 2025
Potential award timeframe	May 2025

L. Definitions. For purposes of this RFB, the words, terms, and phrases set forth below shall have the indicated meanings. Any other terms, words, or phrases herein shall have their ordinary meaning.

1. *Bid* means the written response to this RFB, including, without limitation, any modifications or revisions thereto, submitted pursuant to the terms, conditions and provisions set forth in this RFB.
2. *Bid Documents* means this RFB, the Proposed Contract, Exhibits, any addenda or documents issued by SWACO after release of this RFB but before the Bid due date.
3. *Bidder* means any vendor that submits a Bid.
4. *FCSL* means the Franklin County Sanitary Landfill located at 4200 London Groveport Road, Grove City.
5. *MRTS* means the Morse Road Transfer Station located at 4262 Morse Road, Columbus.

6. *Project* means providing all necessary labor, equipment, tools, and materials required to install a bulk waste compactor with conveyor at the Morse Road Transfer Station as described in the RFB Documents.
7. *RFB* means this Request For Bids.
8. *Sample Contract* means the sample contract provided by SWACO to potential Bidders setting forth the proposed terms, conditions, provisions and/or specifications which may govern the relationship of SWACO and the Successful Bidder, if any, upon award of the contract for the Project.
9. *Successful Bidder* means the Bidder submitting the lowest and best responsive bid as determined by SWACO in its sole and complete discretion.
10. *SWACO* means the Solid Waste Authority of Central Ohio.

III. Bid Format and Requirements

- A. Bid Format. All Bids must be electronically uploaded to SWACO using the link and instructions provided in Section IV below.
- B. Bid Requirements. All Bids should be assembled in sequential order of the requested information in this Section III and shall be submitted in such a manner as to facilitate the review of the content contained therein.
 1. All prospective Bidders must have experience performing five (5) similar projects within the past ten (10) years of similar size and scope of work. All Bidders should be prepared to show proof of such experience upon request. Failure to provide documentation will result in disqualification from the bidding process.
 2. Bidder is required to submit a proposed fabrication and installation schedule with the Bid.
 3. **Bids must be submitted using the Bid Sheet contained in Exhibit B, along with the *Required Forms and Documents*.**
 4. Bidders must disclose any employees who were previously employed at SWACO within the last two (2) years**.

**For every employee disclosed, please provide the date he/she was hired, a detailed explanation as to how the Bidder will prevent the employee from participating in this Project, and an affirmation from the employee that he/she will not disclose confidential information acquired in the course of his/her employment with SWACO.
- C. Bid Preparation Costs. All costs of preparing and submitting a Bid pursuant to the Bid Documents shall be the sole and complete responsibility of the Bidder.
- D. Required Forms and Documents. Each Bid must contain the following:
 1. Required Forms, attached hereto as ***Exhibit B***, must be filled out in their entirety, fully executed, and included with the Bid:
 - a) Bid Sheet and Bidder's Representative
 - b) Non-Collusion Affidavit
 - c) Non-Discrimination Affidavit
 - d) Affidavit of Authority

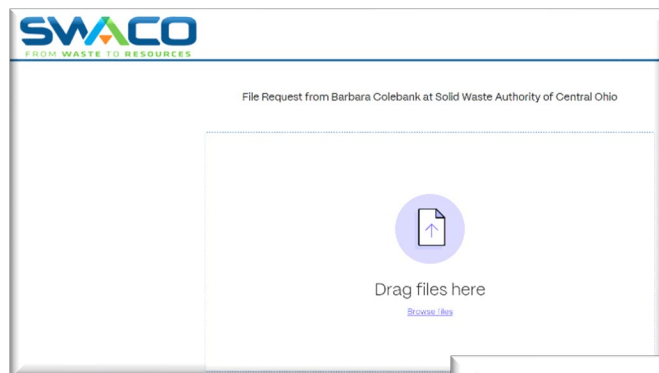
- e) Delinquent Tax Affidavit
 - f) W-9 Form (Rev. March 2024 by the IRS)
 - g) Addendum Acknowledgment
 - h) Exceptions to RFB
 - i) Acknowledgement (Local, Certified, EOE, and Green)
2. Bidders must also include with their Bid the following required documents:
- a) Bidder's Statement – The Bidder's Statement must provide evidence that will enable SWACO to judge the responsibility, experience, skill, and financial standing of Bidder by including detailed information to the effect that Bidder maintains a permanent place of business, statements as to its present physical condition, and evidence to the fact that Bidder has a suitable financial status to meet the obligations to furnish the equipment, materials, and labor referenced in the bid package for purchase by SWACO.
 - b) Bid Guarantee – The Bid Guaranty is surety that if a Bid is accepted, the Bid price will be honored in the contract.
 - i. A Bid Guarantee is to be provided by the Bidder stating that a Bid Bond can be acquired if the Project is awarded to them. A Bid Bond pursuant to Ohio Revised Code 153.571 in which the bond guarantees the Bid price.
 - ii. The Bid Guarantee can be in the form of: (i) a bond equal to one hundred percent (100%) of the Bid price; or, (ii) a certified check, cashier's check or letter of credit pursuant to Chapter 1305 of the Ohio Revised Code on a solvent bank note equal to ten percent (10%) of the Bid price.
 - c) Consent of Surety – A Consent of Surety is to be provided by the Bidder stating that a Payment Bond can be acquired if the Project is awarded to them. A Payment Bond guarantees the Successful Bidder's payment of all persons and/or organizations providing labor and/or materials in the prosecution of the Services as set forth in the RFB Documents. Such payment bond shall be equal to one hundred percent (100%) of the contract price.

IV. Submitting the Bid

A. Electronic Upload. All Bids must be uploaded electronically in PDF format and titled, "**Bidder Name – MRTS COMPACTOR.**" Please upload document(S) to the link below and be sure to label it with your company name as shown. ZIP FILES WILL NOT BE ACCEPTED. Please include Bidder's name with the file name and upload to the following link:

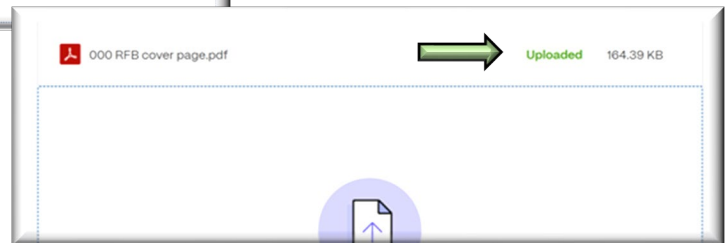
<https://swaco.sharefile.com/r-rac4a97c3badf479f9608e0cea0e1835e>

Click on the link above, which will take you to another screen to enter your email, name, and company before the link opens for you to submit your Bid.



Next, drag and drop your documents into the ShareFile box.

Please Note: A successful upload will display as shown to the right ➡.



Do not email your Bid if you are having problems uploading your document(s). If you are not able to upload the Bid documents to the link above, please contact Barbara Colebank at barbara.colebank@swaco.org.

B. Bid Submission. It is the sole responsibility of the Bidder for the electronic upload of its Bid prior to 2:00 p.m., April 11, 2025.

1. The submission of a Bid shall be considered evidence that the Bidder has examined and is satisfied as to the terms, conditions, provisions, specifications and/or requirements for the Project described in the Bid Documents.
2. No pleas of ignorance of any of the terms, conditions, provisions and/or specifications set forth in the Bid Documents shall be accepted as a basis for any claim for an increase in the amount bid by a Bidder or an extension of the times set forth in the Bid Documents.
3. Unless otherwise specified in the Bid Documents, the Bid price(s) shall include all applicable federal, state, and local taxes. The Successful Bidder shall pay all taxes lawfully imposed on it with respect to any product or service delivered in accordance with the Bid Documents and/or any contract awarded as a result of the process set forth in the Bid Documents.
4. Failure to submit the Bid electronically to the link in Paragraph A above shall not be considered as a valid submission to SWACO.
5. Bids submitted by facsimile transmission, e-mail, or in any other form not specified herein shall not be accepted by SWACO.

C. Bid Documents. As appropriate, the Bid Documents must be signed by the individual, by one (1) or more members of the partnership, by one (1) or more members or officers of each firm representing a joint venture, or by one (1) or more officers of a corporation, or by an agent of the Bidder legally qualified and acceptable to SWACO.

1. If the Bid is made by an individual, his or her name, and business address must be set forth in the Bid;

2. If the Bid is made by a partnership, the name and business address of each partnership member must be indicated in the Bid;
3. If the Bid is made as a joint venture, the name and business address of each member or officer of the firms represented by the joint venture must be indicated in the Bid;
4. If the Bid is made by a corporation, the name of the state under the laws of which the corporation is chartered and the name and title of the officer or officers having authority under the bylaws to sign contracts, the name of the corporation, and the business address of its corporate officials must be shown.

V. Bid Questions, Modifications, Withdrawal, and Opening

A. Bidder Requests for Information and Addendums. Requests for information from a Bidder shall be submitted **in writing only** to SWACO Procurement via e-mail at **procurement@swaco.org** or to SWACO, Attn: SWACO Procurement, 4239 London Groveport Road, Grove City, Ohio 43123. **Any and all such requests must be received no later than 4:00 p.m. on April 4, 2025.** SWACO shall respond to any properly submitted request for information by a written addendum issued to all Bidders who have obtained the Bid Documents for this Project.

1. In addition, SWACO, on its own initiative, may issue such other addenda as it may deem appropriate from time to time. No request for information shall be considered answered by SWACO until SWACO has issued an addendum in response to such request for information, and copies of the written request for information and SWACO's response has been issued to each Bidder.
2. Upon receipt of any addendum, Bidders shall notify SWACO in writing of its receipt of the addendum by completing the *Addendum Acknowledgement* form in **Exhibit B** and submit with their Bid submission.

B. Modification of Bids. At any time prior to the opening of Bids, a Bidder may modify its Bid in writing by submitting a modification marked in the same manner as the original document to SWACO. The document must be marked as a modification or replacement to the original electronic submission. Any such modification must be received by SWACO prior to the opening date and time of the Bids to be considered effective.

C. Withdrawal of Bid. Prior to the opening of Bids, a Bidder may withdraw its Bid provided the Bidder makes a written request to withdraw the Bid. Such requests must be received by procurement@swaco.org or at the address indicated above in Paragraph A prior to the Bid opening. The written request to withdraw must be executed by a party authorized to execute the Bid, include an executed Affidavit of Authority, and be electronically uploaded to the link provided in Section IV. Any properly withdrawn Bid shall be returned to the Bidder unopened.

D. Rejection or Waiver of Bids. SWACO may, in its sole and complete discretion, at any time prior to SWACO's Executive Director's execution of any contract that may be awarded to the apparent Successful Bidder, terminate the process set forth in this RFB and not accept any Bids; reject or waive any and/or all Bids; waive any irregularities contained in any Bid; and/or reject all bids and advertise for new Bids.

E. Bid Opening. All Bids received at or before 2:00 p.m., April 11, 2025, shall be electronically opened. Bid Results will be emailed to those who registered to download the Bid Documents.

F. Termination of RFB Process. SWACO reserves the right to terminate the process contained in this RFB and/or to reject any and/or all of the Bids on any basis without disclosure of a reason. Solicitation and/or opening of any Bid submitted in response to this RFB and the other Bid Documents does not create any express or implied obligation on SWACO to award the Proposed Contract. SWACO may, at its sole and complete discretion, disqualify and/or refuse to consider any Bid and/or Bids, and/or refuse to award the Proposed Contract to any Bidder and/or Bidders, for any reason, including, without limitation, the following:

1. The failure of a Bidder to respond to all requirements specified in the Bid Documents.
2. More than one (1) Bid for the Project is submitted from an individual, firm, joint venture, or corporation under the same or different name, or corporation under the same name or corporations with one (1) or more of the same persons as officers or directors of such corporations, or corporations which are holding companies, parent companies or sister companies which are subsidiaries of such corporations.
3. Evidence of collusion among Bidders.
4. Bid prices which are obviously unbalanced.
5. Bidder lacks sufficient experience, competency and/or adequate machinery, equipment, plant, or other resources to perform the Proposed Contract and/or as required by the other Bid Documents.
6. Evidence of uncompleted work, whether or not with SWACO, which, in the opinion of SWACO, might hinder or prevent the prompt delivery of the Project if it should be awarded to the Bidder.
7. Bidder has an “unresolved audit finding” issued by the Office of the Auditor of the State of Ohio.
8. For the reasons set forth below, Bids will be considered irregular and may, at SWACO’s sole and complete discretion, be rejected. However, SWACO is not obligated to reject such Bids.
 - a) If the Bid is on a form other than that furnished by SWACO and/or if the form is altered or any part thereof is detached. Computer generated facsimiles of SWACO’s forms are acceptable.
 - b) If there are unauthorized additions, conditions or alternate bids or irregularities of any kind which may tend to make the Bid incomplete, indefinite, or ambiguous as to its meaning.
 - c) If the Bidder adds any provisions reserving the right to accept or reject an award, and/or to enter into the Proposed Contract pursuant to an award. This does not exclude a Bid limiting the maximum gross amount of awards acceptable to any one (1) Bidder at any one (1) Bid letting, provided that any selection of awards will be made by SWACO.
 - d) If the Bid does not contain a price for a particular Bid item.

- e) The Bidder fails to return all of the Bid forms included in the Bid Documents (including, without limitation, required affidavits), and/or to completely fill out the Bid forms and/or to provide complete responses for requested information.
- f) If the Bid is not properly signed.

VI. Standard Terms and Conditions

- A. Budgeting. All budgets are subject to the annual appropriation of funds by the SWACO Board of Trustees. Budget information is not available for this Project; however, it is fully funded.
- B. Taxes and Payment. The Bidder is hereby notified that:
 - 1. SWACO is a Political subdivision pursuant to ORC Section 343 and exempt from State sales or use taxes. Therefore, such taxes shall not be included in any rate or price quotations submitted as part of any Bid; and
 - 2. SWACO does not pay retainers, deposits, or make any other advance payments prior to services rendered.
- C. Contract Termination. SWACO's standard contract termination is at least fifteen (15) days in writing prior to the date of the intended early termination of the Proposed Contract.
- D. Pricing. Bidders are to quote firm or fixed prices for the duration of any contract which may be a result of the Bid unless otherwise noted in the Bid Documents. In case of discrepancy in computing the amount of the Bid, the unit price quoted will govern. In the event of a conflict between the price in numbers and the price in words, the price in words will control.
- E. Invoicing. All invoices shall be submitted monthly. Each invoice shall show the SWACO purchase order number, the quantity and brief description of the service performed, material or equipment furnished, and the total amount of cost.
 - 1. Each invoice must separate and list this information per facility location.
 - 2. If changes occur, other than the scheduled service, material or equipment ordered, invoice must state extra charges, hours, material or equipment, or services provided and include a brief description of extra charges, which must be preapproved in writing by SWACO. The invoice must indicate the SWACO personnel who authorized the changes and/or extra charges. If applicable, a copy of an executed "change order" must be included.
- F. Additional Fees. Notwithstanding any term, condition, or provision set forth in the Bid, SWACO shall not be obligated or liable to the Successful Bidder and/or any other party for any late payment, collection costs, fees, and/or interest charges.
- G. Indemnification and Insurance. Each Successful Bidder is advised that in addition to any other terms, conditions or provisions that may be contained in any contract awarded and executed as a result of this RFB (including without limitation warranty provisions), the Successful Bidder shall agree to the following indemnification and insurance provisions:
 - 1. *General Duty to Indemnify SWACO*. The Successful Bidder shall indemnify and hold harmless SWACO, its trustees, officers, employees and representatives from and against all claims, damages, losses, liens, causes of action, suits, judgments, and

expenses (including reasonable attorney's fees and other reasonable costs of defense), of any nature, kind or description, which (a) are caused by or result from the performance of the Services by the Successful Bidder, anyone directly or indirectly employed by the Successful Bidder, any sub-contractor of the Successful Bidder, or anyone for whose acts the Successful Bidder is legally liable, and (b) are attributable to bodily injury, personal injury, sickness, disease or death of any person, or to damage to or destruction of property, but (c) only to the extent they are caused by any negligent, reckless or willful act, error or omission of the Successful Bidder, anyone directly or indirectly employed by the Successful Bidder, any sub-contractor of the Successful Bidder, or anyone for whose acts the Successful Bidder is legally liable. The terms and conditions of this paragraph shall survive termination of this contract for any reason.

2. Successful Bidder shall promptly correct, repair, and/or replace any part, work, supplies and/or other materials installed as part of the Services and damaged and/or destroyed as a result of an insured loss or damage. Such correction, repair and/or replacement shall be the Successful Bidder's sole responsibility and shall be undertaken and completed at no additional cost to SWACO.

3. **PLEASE NOTE: THE GENERAL DUTY TO INDEMNIFY SWACO IS NOT NEGOTIABLE. IF YOU ARE UNABLE TO AGREE TO THE PROVISION SET FORTH ABOVE, SWACO WILL BE UNABLE TO ENTER INTO A CONTRACT WITH YOUR COMPANY.**

4. *Liability Insurance.* The Successful Bidder shall purchase and maintain the following liability and other insurance at the indicated limits, under the terms set forth below:

- a) General Liability Insurance, containing the following limits and terms:
 - 1) \$1,000,000.00 per occurrence
 - 2) \$2,000,000.00 aggregate
 - 3) \$1,000,000.00 Products/Completed Operations Aggregate
 - 4) Name SWACO as an additional insured
 - 5) Waiver of subrogation in favor of SWACO and all related entities or subsidiaries, employees, agents and/or representatives
 - 6) Automobile Liability Insurance, containing a limit of \$1,000,000.00 per occurrence
 - 7) Worker's Compensation and Employer's Liability Insurance, containing the following limits:
 - Statutory Limits for the State of Ohio \$500,000.00/\$500,000.00/\$500,000.00 Employer's Liability Limit
 - 8) Professional Liability Insurance covering errors, omissions, and/or negligence of the Advisor with a coverage limit of \$5,000,000.00.
 - 9) Umbrella Liability Insurance containing the limit of \$4,000,000.00 per occurrence and terms including the following "form coverage."

b) **The limits set forth above may be adjusted according to industry standards, risk, and further assurances.**

c) Each policy of insurance required to be purchased and maintained by the Successful Bidder shall be purchased from an insurance carrier rated by A.M. Best as A-, VII or better;

d) Each policy and respective certificate of insurance shall expressly provide that should the Successful Bidder's insurance lapse, be cancelled, non-renewed or materially altered, the Successful Bidder shall provide SWACO with no less than thirty (30) days prior written notice of such cancellation, non-renewal, expiration or material alteration of the coverage contained in such policy or evidenced by such certificate of insurance.

e) The Successful Bidder shall maintain all insurance in the required amounts, without interruption, from the date of the execution of the contract until the date of the termination of the contract or the date of payment of the final invoice issued by Successful Bidder, whichever is later. Failure of the Successful Bidder to comply with the terms and conditions of this paragraph shall constitute a material breach of the contract and shall be cause for termination of this Contract by SWACO.

f) Insurance policies required to be purchased and maintained by the Successful Bidder may include a reasonable loss deductible, as is customary for the Successful Bidder's industry, which shall be the sole responsibility of the Successful Bidder to pay in the event of any covered loss.

5. SWACO and the Successful Bidder waive all rights against each other for damages caused by fire or other perils to the extent of actual recovery of any insurance proceeds under any property insurance obtained pursuant to the requirements set forth above or any other property insurance applicable to the performance of the Services, except such rights as they have to proceeds of such insurance held by SWACO as fiduciary. The Successful Bidder agrees to obtain waivers in favor of SWACO of such claims by all of its subcontractors.

6. Notwithstanding the paragraph above, and regardless of the amount of any insurance proceeds recovered by the parties under the insurance policies set forth above, the Successful Bidder shall be liable to SWACO for the full amount of any claims, damages, losses, liens, causes of action, suits, judgments and expenses (including reasonable attorney's fees and other reasonable costs of defense) of any nature, kind or description which are in excess of such insurance proceeds.

VII. Applicable Law

A. Venue. Without regard to its own "choice of law" provisions, the bidding process and any Contract awarded as a result of the process set forth in this RFB shall be governed by the laws of the State of Ohio to the exclusion of the laws of any other jurisdiction. The State of Ohio shall have jurisdiction over any action hereunder or related to the implementation of the bidding process contained herein and the performance of any Contract awarded hereunder as a result of this bidding process to the exclusion of any other forum. Any action or proceeding shall take place in a court of law located in Franklin County, Ohio.

B. Non-Discrimination. Bidders shall not discriminate against any employee or qualified applicant for employment who is both available and qualified for work because of age, race, color, religion, sex, disability, creed, military status, or national origin. Bidders shall not discriminate based upon age, race, color, religion, sex, disability, creed,

military status, or national origin in any undertaking related to employment including, but not limited to, such actions as hiring, upgrading, demotion or transfer, recruitment or recruitment advertising, layoff or termination, rates of pay or other forms of compensation, and selection for training, including apprenticeship.

C. Public Records. All Bidders are advised that Bids received by SWACO in response to this RFB may constitute public records as defined by Ohio Revised Code Section 149.43 and any additional information submitted by Bidder pursuant to this RFB shall become the property of SWACO. However, if there is material in a Bid that a Bidder deems to be confidential, it should be clearly identified as such, marked confidential, and accompanied by a written explanation stating the basis of such claim. Any confidential material that is properly designated shall be removed from the Bid prior to release of the Bid to the public if permitted by the laws of the State of Ohio including, without limitation, Ohio Revised Code Section 149.43. The determination as to the confidentiality of any material identified as confidential by a Bidder shall be made by SWACO in SWACO's sole and complete discretion. SWACO shall assume no risk, nor shall it be held liable by any Bidder for the release of any material which Bidder may claim to be confidential. Submittal by Bidder of a Bid to SWACO shall be deemed acknowledgement of the terms and provisions contained in this paragraph C.

D. Prevailing Wages. Prevailing Wage rates of wages for workers employed on this Project are determined pursuant to the Ohio Department of Commerce. Prevailing Wage rates are included with the Bid Documents, attached hereto as **Exhibit G**; however, it is the responsibility of the Bidder to understand, and report correct prevailing wages (**Sections 4115.03 to 4115.16 of the Ohio Revised Code**).

VIII. Bid Award

A. Award Basis. There are estimated quantities listed in this RFB, and unit prices (to the nearest cent) are requested. Bids are on a firm basis and shall remain in effect for the term of the contract. Prices in the Bid shall govern for award evaluation and payment purposed. SWACO reserves the right to award this contract in the best interest of SWACO.

B. Lowest and Best. SWACO shall award the contract for the Project to the Bidder that submits the lowest and best responsive Bid. Bids will be evaluated within sixty (60) days of the Bid opening day. All Bidders shall allow SWACO sixty (60) days after the opening of Bids to make an award of Contract without invalidating their Bid(s). SWACO may, at its sole option, request any or all Bidders to provide additional information. Factors that determine the lowest and best responsive bid include without limitation:

1. The Bidder's responsiveness to the terms, conditions, provisions and/or specifications set forth in the Bid Documents.
2. The known quality of the Bidder's work on similar Projects.
3. The Bidder's capability to undertake the work of the Project in accordance with the terms, conditions, provisions and/or specifications contained in the Bid Documents, and including, without limitation, those contained in the Proposed Contract.
4. The Bidder's references.
5. Bidder warranties.

C. Notice of Award. SWACO shall issue a letter indicating SWACO's intent to award the Contract to the Bidder submitting the lowest and best responsive bid ("Successful Bidder"), if any. An award is effective only upon execution of a written Contract by both

SWACO's Executive Director, pursuant to its Procurement Policy, and the Successful Bidder (if any).

IX. Awarding the Contract

A. Information Provided to Successful Bidder. SWACO shall provide to the Successful Bidder, upon request, any information concerning the Project to which it has access. SWACO may, at its sole option, provide information to the Successful Bidder in electronic format.

B. Contract Execution. Any Contract awarded as a result of the bidding process set forth in this RFB and the other Bid Documents shall be executed by the Successful Bidder and returned to SWACO pursuant to the terms, conditions, and provisions set forth in the Bid Documents and pertinent provisions of the Ohio Revised Code, within thirty (30) days after the Bidder has received notice of the award of the Contract and the Contract for signature. No Bid or Contract shall be considered binding upon SWACO until execution of the Contract by SWACO's Executive Director and, if required by SWACO's procurement policy or deemed appropriate by SWACO staff, approval of the Contract by SWACO's Board of Trustees.

1. SWACO may, at SWACO's sole and complete discretion, withdraw the award of the Contract to the Successful Bidder if the Successful Bidder shall fail to execute the Contract and return the executed Contract to SWACO within thirty (30) days of receipt of the notice of award of the Contract.

2. If SWACO should withdraw the award of the Contract to a Successful Bidder pursuant to subparagraph 1 above, SWACO may, in its sole and complete discretion, award the Contract to the next lowest and best responsive Bidder, re-advertise and re-bid the entire Project, or not award the Contract at all.

Exhibit A

003. Additional Information

A. The Project

1. The duration of construction for Morse Road Transfer Station Compactor Project (“Project”), as described in this RFB, is for an approximately one (1)-year contract per project milestones.
2. The Project generally consists of the purchase and installation of a bulk waste compactor and material conveyor. The equipment will be installed in Morse Road Transfer Station after the Morse Road Transfer Station Improvements Project has been completed.
3. Please reference Morse Road Transfer Station Improvements Project bid drawings and technical specifications (available as a separate downloadable document) in addition to the supplemental specifications (Exhibit E) provided with this RFB. Additionally, there are two supplemental specification sections included with Exhibit A.
4. The Bidder is required to submit a proposed fabrication and installation schedule with the Bid.
5. SWACO is concurrently advertising an RFB Morse Road Transfer Station Improvements Project. Work on this Project will need to be coordinated with the improvements’ contractor to ensure all foundations and utilities installed are to the compactor and conveyor manufacturer’s requirements.
6. The Project will occur within the boundaries of the MRTS property. Construction will need to be coordinated with SWACO’s project manager.
7. Site visits are encouraged and can be scheduled by emailing Mr. Wes Jordan at wes.jordan@swaco.org. Site visits must be completed prior to April 3, 2025.
8. A mandatory pre-bid meeting will be held at 3:00 p.m. on March 21, 2025. **All Bidders are required to attend the pre-bid meeting virtually.**

Mandatory Pre-Bid Meeting

RFB Morse Road Transfer Station Compactor Project

March 21, 2025, at 3:00 p.m. (EST)

Location:

Solid Waste Authority of Central Ohio (SWACO)
Morse Road Transfer Station
4262 Morse Road
Columbus, Ohio 43230

Virtual – Mandatory

Microsoft Teams

[Join the meeting now](#)

Meeting ID: 271 148 952 465

Passcode: ic2bM2tR

Dial in by phone

[+1 513-301-2202,,29421989#](#) United States, Cincinnati

[Find a local number](#)

Phone conference ID: 294 219 89#

B. Work Hours

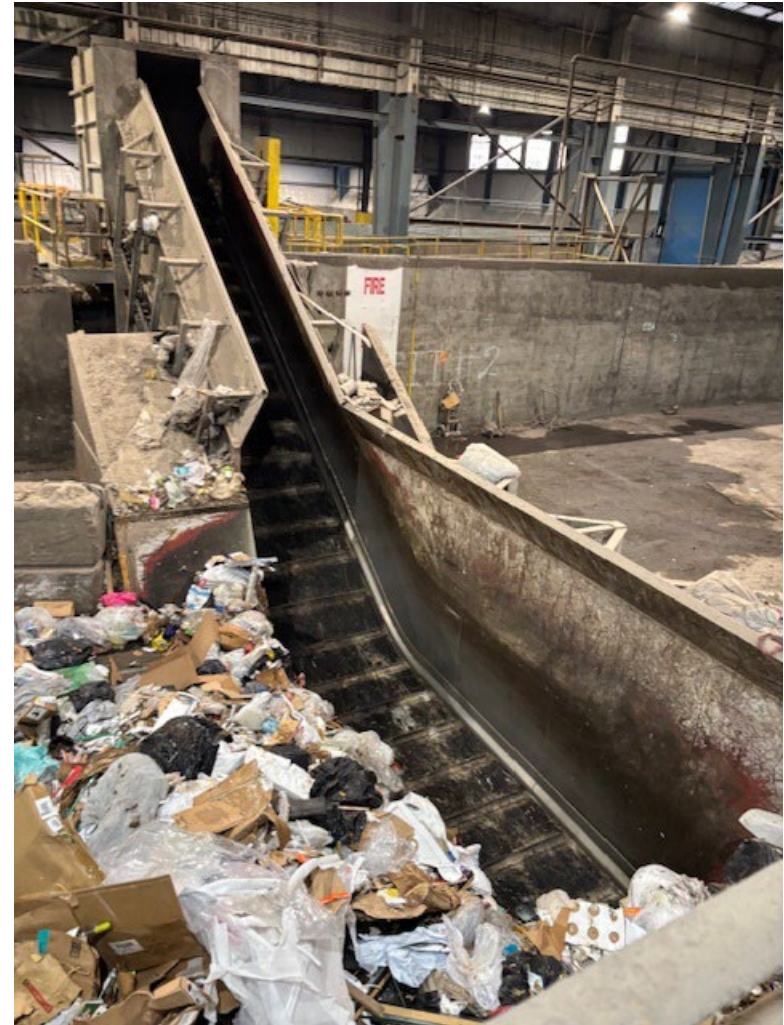
1. Work hours for this Project are permissible during daylight hours only and are designated below:
Monday through Friday 7:00 a.m. to 5:00 p.m.
Saturday and Sunday.....No Work
2. Any additional hours outside of the designated work hours above (MUST be pre-approved by SWACO's project manager.
3. No work shall be performed without a SWACO designated representative onsite.

C. General Information

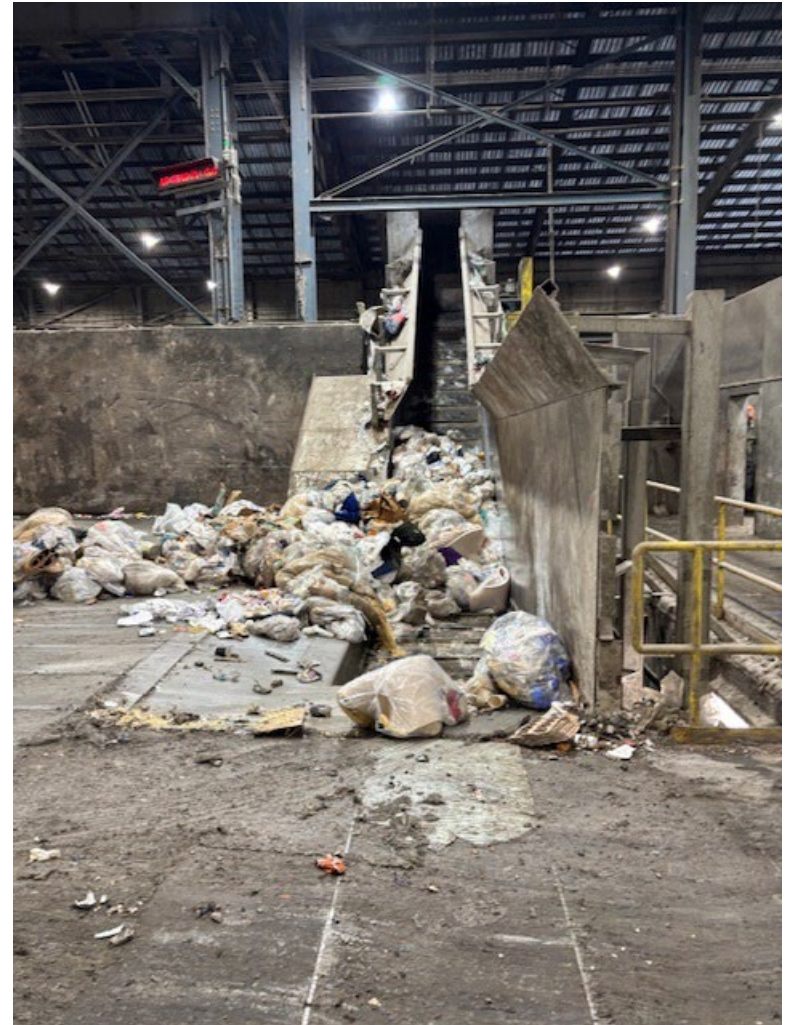
1. There will be no exceptions to extend time for bidding or construction.
2. Reference attached "Sample Conveyor Photos" in this Exhibit A.
3. Reference supplemental specification Section 11820 Bulk Waste Compactor for requirements of the compactor.
4. Reference supplemental specification Section 11820A Conveyor for requirements of the compactor.
5. Compactor manufacturer is required to provide a fully operational material conveyor that will interface with the compactor. Provide pricing in accordance with the provided bid schedule.

D. Project Milestones

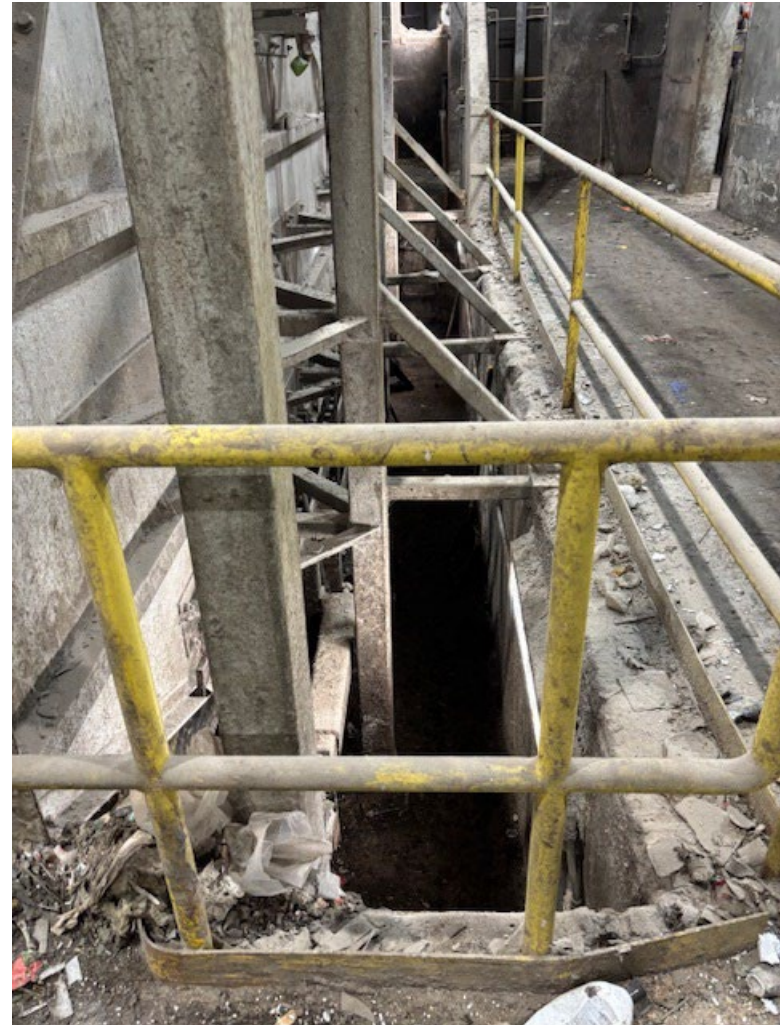
Anticipated Notice of Award May 2025
Compactor/Conveyor Installation Starting March 31, 2026



Sample Conveyor Photos 1-2



Sample Conveyor Photos 3-4



Sample Conveyor Photos 5-6 – Shows Access to Pit Behind Backstop

SECTION 11820

BULK WASTE COMPACTOR

PART 1 GENERAL

1.01 GENERAL

- A. This specification will provide a complete and operational bulk waste compactor to handle solid waste managed on the tipping floor of the transfer station. The compactor will be capable of producing single bales of solid waste to maximize truck capacity and loading efficiency. The compactor shall be programmable to obtain the designed optimum trailer load size. The solid waste from the tipping floor is generally municipal solid waste and can include bulky and challenging material requiring heavy compaction and material crushing to obtain the required bale weights. Specified minimum compaction forces, as designated in these specifications, are intended to handle this waste, and produce the required solid waste bales.

The compactor will be installed in the building addition's west bay. The west bay will be built as part of a separate construction project, the Morse Road Transfer Station Improvements. Reference that project's construction plans and specifications. This installation must include the required conveyor system to deliver the pushed waste from the tipping floor to the compactor. It is the compactor supplier's responsibility to provide a conveyor that will handle the waste and integrate with the compactor's controls. Also, include controls and indicator(s) to facilitate operation of the compactor with truck loading of the completed compacted solid waste bales. Load cells on the compactor will provide local indication of the compacted material for truck loading.

Electrical work to make final connections, controls mounting, wiring and integration is a part of this project. Electrical supply work and concrete work will be completed under the Morse Road Transfer Station Improvements project. Coordination with that project is required to gain an acceptable installation. Concrete pedestals or other mounting requirements will need to be coordinated with the designer of the Morse Road Transfer Station Improvements project and be based on manufacturers provided loads.

Primary loading of the compactor is intended to be completed with the conveyor. Trailer connections with the compactor must be facilitated through an automated hook assembly connecting to the pins integrated into the existing trailers. Provision of this connecting device is required as part of this project.

1.02 DISCRIPTION

- A. Scope:
1. Contractor shall provide all labor, materials, equipment, training, recommended spares and/or tool kit, maintenance support, and incidentals as shown, specified and required to furnish and install the compactor complete and operational.

- B. Coordination:
 - 1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the compactor Work.
- C. Relation Sections – Reference specifications provided with Morse Road Transfer Station Improvements, Project 5940, in addition to this project specifications
 - 1. Division 03, Concrete.
 - 2. Division 16, Electrical
 - 3. 11820-A Conveyor

1.03 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Manufacturer shall have a minimum of ten (10) years' experience producing compactor equipment and shall be able to show evidence of at least ten installations in satisfactory operation within the last 5 years. Installations and contact information shall be provided within the bid documents.
- B. Component Supply and Compatibility:
 - 1. Obtain all equipment included in this Section regardless of the component from compactor manufacturer.
 - 2. The compactor equipment manufacturer shall review and prepare all Shop Drawings and other submittals for all components furnished under this Section. Shop drawings shall be submitted for Owner/Engineers approval prior to fabrication.
 - 3. All components shall be specifically constructed for specified service conditions operating in a tipping floor environment and shall be integrated into the overall assembly by the compactor equipment manufacturer.
- C. Factory Testing:
 - 1. Prior to shipment of the equipment, the fully assembled compactor shall fully tested at the fabricated location.

1.04 SUBMITTALS

A. Shop Drawings and Product Data:

1. Submit manufacturer's literature, illustrations, specifications, and engineering data showing the following:
 - a. Complete descriptions in sufficient detail to permit item by item comparison with Specifications.
 - b. Dimensions and required clearances.
 - c. Weights.
 - d. Mounting base plate design load and detailed base plate requirements.
 - e. Bale length, weight, and compaction capacity.
 - f. Performance characteristics.
 - g. Layout drawings for all equipment showing installation details.
 - h. Wiring diagrams for all electrical equipment.
 - i. Hydraulic diagrams for all pump systems.
- J. Manufacturer's installation and testing instructions.
- k. Affidavits of compliance with referenced standards and codes.
- I. Manufacturer's standard guarantee.

B. Operation and Maintenance Manuals:

1. Furnish two (2) Hard Copies and electronic versions of Operation and Maintenance Manuals.
2. Required Operation Data:
 - a. Explanation of all safety considerations relating to operation.
 - b. Complete functional description of the operating procedure for the compactor loading the trucks. This shall include any graphics required to describe the compactor function. The intent is to provide a step-by-step procedure for loading the compactor and then the truck. This will describe the steps to produce blocks or bales that will result in the maximum truck load.
3. Required Maintenance Data:

- a. Include all information and instructions required to keep equipment properly lubricated, adjusted and maintained so that it functions economically throughout its full design life.
- b. Recommended spare parts lists.
- c. Recommended schedule of routine maintenance tasks.
- d. Name, address and phone number of manufacturer and manufacturer's local service representative for all components and assemblies.
- e. Include copies of all approved shop drawings.

C. Factory Test Results:

- 1. Compactor shall be tested and submit test results prior to shipment.

1.05 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

- 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work. Anchor plates shall be provided/installed under separate contract work. All coordination to provide adequate plates is a part of this contract.

B. Storage and Protection:

- 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platform, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

C. Acceptance at Site:

- 1. All boxes, crates and packages shall be inspected by manufacturer's site contractor upon delivery to the Site. Manufacturer shall be responsible for any loss or damage that exists to equipment or components.

1.06 WARRANTY

- A. The Manufacturer shall warranty all compactor materials, equipment, and incidentals for a period of one year or 3,000 hours of individual operation from first day of service, whichever occurs first. All labor and materials shall be included for any repairs.

1.07 SEQUENCING AND SCHEDULING

- A. Do not install equipment until the design strength of all cast-in-place concrete supporting elements has been attained.

PART 2 PRODUCTS

2.01 COMPACTOR

- A. General:
 - 1. Compactor shall be a stationary, electric compaction machine designated for bulky residential waste with remote control and can be operated autonomously and manually. The compactor goal is to utilize tipping floor space more efficiently by compacting light residential waste into heavier bales to maximize commercial floor space and the carrying capacity of the transport vehicles.
 - 2. Provide a compactor with a size that will fit in the west bay according to project drawings.
- B. Hydraulic System:
 - 1. Minimum combined main hydraulic system motor horsepower of 300 HP.
- C. Ram:
 - 1. Provide a ram with a minimum compaction force of 250 tons and a production rate of 100 tons per hour.
- D. Bale:
 - 1. Provide a bale with a size of 84" wide x 84" deep x 34' long.

2. Adjustable bale weight to satisfy truck loading capacity.
3. Operate at an hourly capacity of 100 tons

E. Electric and Controls:

1. Provide local operator control panel
2. Provide a remote-control panel for compaction operation and material loading
3. Provide an LED display for tipping floor
4. Provide NEMA 4 rated control panel with PLC
5. Provide program to interface with conveyor
6. Front and rear load cells shall be utilized on each mount to indicate individual and cumulative bale weight.
7. Operations and instrumentation panel shall be capable of auto reporting daily production data in .csv file format that includes, at minimum, load/cycle number, load start time, load end time, weight, trailer number (either manual import or RFID reader). Data will be able to be downloaded by both USB connection and remotely.

F. Operation:

1. Loading is direct into compactor from conveyor provided by compactor provider.
2. Compaction is accomplished by pushing solid waste into bale chamber against closed gate at discharge end with reciprocating platen driven with hydraulic cylinders.
3. Platen contains jam release features to allow platen knife and top plate to be adjusted downward should platen become wedged.
4. Bale weight is summed through loads cells to maximize truck capacity.
5. Bales are ejected into transport vehicles which are latched to the chamber with hydraulic hitch.
6. Bales are ejected by opening vertical gate and operating platen to push bale clear of the chamber into transport vehicle.

G. Construction:

1. Compactor is designed for flat surface with reinforced slab installations.
2. Provide construction materials and any potential upgrades for evaluation.

2.02 TOOLS AND SPARE PARTS

- A. Contractor shall supply all specialty tools and a spare parts kit for compactor maintenance. One complete set of filters, belts and supplies for the first maintenance cycle of the unit shall be provided.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor shall verify that structures and equipment are compatible. Make adjustments required to place system in proper operating condition.
- B. Assembly and Factory Test compactor prior to shipment to Customer. Customer shall have the option of witnessing the factory test. Factory test shall be certified by company officer having run without failure or leaks for a period of 4 hours at normal duty cycles during that time. All items shall be repaired prior to shipment.

3.02 INSTALLATION

- A. Manufacturer's representative shall check and approve the installation prior to operation. Manufacturer's representative shall field test and calibrate the equipment to assure the system operates to the Owner's satisfaction.
- B. Lubricate, adjust, test, and leave compactor in proper operation condition with all repairs made prior to leaving the site. All hydraulic oil and lubricants shall be provided as a part of this contract.
- C. Test operate compactor in the presence of Engineer to demonstrate its ability to operate under maximum rated load, without vibration, jerking, slipping, overheating and to perform all functions satisfactorily. Test load a minimum of four trucks to ensure satisfactory operation.

3.03 FIELD QUALITY CONTROL

- A. Required Manufacturer's Services: Retain qualified factory-trained representatives of the compactor equipment manufacturer for a minimum period of 8 hours (total) to perform the following services. The manufacturer's representative shall check and approve their respective portion of the installation, supervise initial operation and testing in the presence of the Engineer and instruct the Owner's personnel in operation and maintenance of the equipment:
 - 1. Equipment Installation:
 - a. Oversee installation of the equipment and accessories specified herein.
 - b. Inspect the completed installation and note deficiencies.

2. Start-up and Field Testing:
 - a. Be present and assist Contractor during start-up, adjusting, and field testing of completed installation, as outlined in 3.3.B.
 - b. Furnish test forms and procedures for field testing.
 - c. The manufacturer's representative shall revisit the jobsite as often as necessary until all trouble is corrected and the installation is completely satisfactory to the Engineer.
 3. Instruction of Operation and Maintenance Personnel:
 - a. Provide Operation and Maintenance training as outlined below.
- B. Start-up and Field Testing:
1. Field test and calibrate equipment to demonstrate to the Owner's representative that all equipment will satisfactorily perform the functions and criteria specified in Part 2.
 2. Provide all test apparatus required at no extra cost to Owner.
 3. Follow testing procedures recommended by the manufacturer and approved by the Engineer.
 4. Perform field tests as needed, to be witnessed by the Engineer, to verify operation under field conditions. The objective of these tests shall be to demonstrate that the overall system meets the requirements of the Contract Documents as well as to demonstrate its ability to operate under maximum rated load, without vibration, jerking, slipping, and overheating and to perform all functions satisfactorily. Tests shall involve the successful capacity loading of four trucks minimum. Then observe SWACO employee(s) operating the compactor for a minimum of a one-day period to ensure equipment is operated properly.
- C. Instruction of Operations and Maintenance Personnel:
1. Instruction Course: After equipment is fully operational, and before Owner will assume responsibility for the operation of equipment, the equipment manufacturer's operating specialists shall instruct the Owner's operating personnel in the care, maintenance, and proper operation of the equipment. Two training sessions shall be required. One shall consist of two (2) hours devoted to operations training and one shall consist of two (2) hours devoted to maintenance training.
 2. All training sessions may be videotaped by Owner.
 3. Training manuals shall be provided prior to training sessions.
- D. Manufacturer's Installation Report:
1. Prepare manufacturer's installation reports and submit within 30 days after completion of field testing and operation instruction. The reports shall include the following:

- a. Field testing reports.
- b. Description of installation deficiencies resolved to the Owner's satisfaction.
- c. Names of Owner personnel who attended the operations and maintenance training sessions.
- d. Record copy of materials used for the training sessions including an outline summary of the course.
- e. Signed equipment acceptance forms from the owner establishing the operational date of the compactor for warranty purposes.
- f. Spare parts acknowledgement forms for provided spare parts and manuals to the owner.

END OF SECTION

SECTION 11820A

CONVEYOR

PART 1 GENERAL

1.01 GENERAL

This specification will provide a complete and operational material conveyor to provide solid waste managed on the tipping floor of the transfer station to the bulk waste compactor. The solid waste from the tipping floor is generally municipal solid waste and can include bulky and challenging material requiring heavy duty steel members, belt, drive and motor. Specified minimum waste densities and production rates, as designated in these specifications, are intended to handle this waste, and a steady stream of waste to the compactor.

The conveyor will be installed in a pit on the west side of the tipping floor. The pit will be built as part of a separate construction project, the Morse Road Transfer Station Improvements. Reference that project's construction plans and specifications. This installation must include the required conveyor system to deliver the pushed waste from the tipping floor to the compactor. It is the compactor supplier's responsibility to provide a conveyor that will handle the waste and integrate with the compactor's controls. Also, include an emergency stop and any additional controls and indicator(s) to facilitate operation of the conveyor and compactor.

Electrical work to make final connections, controls mounting, wiring and integration is a part of this project. Electrical supply work and concrete work will be completed under the Morse Road Transfer Station Improvements project. Coordination with that project is required to gain an acceptable installation. Conduit(s) and any other requirements will need to be coordinated with the designer of the Morse Road Transfer Station Improvements project and be based on manufacturers provided loads.

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, training, recommended spares and/or tool kit, maintenance support, and incidentals as shown, specified and required to furnish and install the conveyor complete and operational.

- B. Coordination:
 - 1. Review installation procedures under this and other Sections and coordinate the installation of items that must be installed with, or before the compactor Work.
- C. Relation Sections – Reference specifications provided with Morse Road Transfer Station Improvements, Project 5940, in addition to this project specifications
 - 1. Division 03, Concrete.
 - 2. Division 16, Electrical
 - 3. 11820 Bulk Waste Compactor

1.02 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. Manufacturer shall have a minimum of five (5) years' experience producing conveyor equipment and shall be able to show evidence of at least five installations in satisfactory operation within the last 5 years. Installations and contact information shall be provided within the bid documents.
- B. Component Supply and Compatibility:
 - 1. Obtain all equipment included in this Section regardless of the component from conveyor manufacturer.
 - 2. The conveyor equipment manufacturer shall review and prepare all Shop Drawings and other submittals for all components furnished under this Section. Shop drawings shall be submitted for Owner/Engineers approval prior to fabrication.
 - 3. All components shall be specifically constructed for specified service conditions operating in a tipping floor environment and shall be integrated into the overall assembly by the conveyor equipment manufacturer.
- C. Factory Testing:
 - 1. Prior to shipment of the equipment, the fully assembled compactor shall fully tested at the fabricated location.

SUBMITTALS**A. Shop Drawings and Product Data:**

1. Submit manufacturer's literature, illustrations, specifications, and engineering data showing the following:
 - a. Complete descriptions in sufficient detail to permit item by item comparison with Specifications, at minimum.
 - b. Dimensions and required clearances.
 - c. Design Criteria (dead loads, live loads, material load, tons per hour).
 - d. Structural steel
 - e. Concrete anchors
 - f. Paint coatings
 - g. Performance/mechanical characteristics (motor, electrical, belts drives, belt materials, chutes, backstops).
 - h. Layout drawings for all equipment showing installation details.
 - i. Wiring diagrams for all electrical equipment.
 - j. Interface information
- J. Manufacturer's installation and testing instructions.
- k. Affidavits of compliance with referenced standards and codes.
- I. Manufacturer's standard guarantee.

B. Operation and Maintenance Manuals:

1. Furnish two (2) Hard Copies and electronic versions of Operation and Maintenance Manuals.
2. Required Operation Data:
 - a. Explanation of all safety considerations relating to operation.
 - b. Complete functional description of the operating procedure for the conveyor as it works with the compactor to load trucks.
3. Required Maintenance Data:

- a. Include all information and instructions required to keep equipment properly lubricated, adjusted and maintained so that it functions economically throughout its full design life.
- b. Recommended spare parts lists.
- c. Recommended schedule of routine maintenance tasks.
- d. Name, address and phone number of manufacturer and manufacturer's local service representative for all components and assemblies.
- e. Include copies of all approved shop drawings.

C. Factory Test Results:

- 1. Compactor shall be tested and submit test results prior to shipment.

1.04 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling and Unloading:

- 1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices which are to be embedded in cast-in-place concrete in ample time to prevent delay of that Work. Anchor plates, if used, shall be provided/installed under separate contract work. All coordination to provide adequate plates is a part of this contract.

B. Storage and Protection:

- 1. Store materials to permit easy access for inspection and identification. Keep all material off the ground, using pallets, platform, or other supports. Protect steel members and packaged materials from corrosion and deterioration.

C. Acceptance at Site:

- 1. All boxes, crates and packages shall be inspected by manufacturer's site contractor upon delivery to the Site. Manufacturer shall be responsible for any loss or damage that exists to equipment or components.

1.05 WARRANTY

- A. The Manufacturer shall warranty all compactor materials, equipment, and incidentals for a period of one year or 3,000 hours of individual operation from first day of service, whichever occurs first. All labor and materials shall be included for any repairs.

1.06 SEQUENCING AND SCHEDULING

- A. Do not install equipment until the design strength of all cast-in-place concrete supporting elements has been attained.

PART 2 PRODUCTS

2.01 CONVEYOR

A. General:

- 1. Compactor manufacturer shall partner with conveyor manufacturer(s) to provide a conveyor that will be installed in the pit shown on the drawings. The conveyor will interface seamlessly with the compactor. Compactor manufacturer shall submit two options for the conveyor: one with a rubber or PVC belt, the other with a steel belt.
- 2. Provide a conveyor with a size that will fit in the conveyor pit according to project drawings.

B. Design Criteria, state the following with submittal:

- 1. Dead load
- 2. Live Load
- 3. Material Load
- 4. Tons per hour: minimum of 130 TPH at 82 FT/MIN
- 5. Maximum Load
- 6. Seismic load, if applicable
- 7. Load combinations
- 8. Material handled will be municipal solid waste
- 9. Material density varies, but design density is, at minimum, 350 pounds per cubic yard
- 10. Conveyor capacity is 130 short tons per hour, minimum
- 11. Design operation cycle is 8 to 12 hours per day, 5 days per week

C. Structural Steel:

- 1. All steel detailing, fabrication, erection and identification shall conform to the latest edition of the American Institute of Steel Construction (AISC) specifications. All welding shall be in accordance with the latest edition of the American Welding Society (AWS) specifications D1.1.
- 2. Include all ASTM standards for steel plate and other shapes

D. Concrete Anchors:

- 1. Provide required anchor rod lengths, size, quantity, adhesives, plates, washers, nuts, etc.

E. Grout

- 1. If the surface is not flat enough to allow for the new base plate steel to be fully in contact with it, then the gap must be filled with grout

F. Paint Coatings

1. All new structural steel shall be prepared and coated in accordance with the SSPC and owners final approval of colors as specified.
2. All new structural steel shall be sandblasted on all exposed surfaces and surface prepped, at minimum, with power tool cleaning and solvents.
3. Minimum of one (1) primer coat and one (1) top coat.
4. Weld disturbed areas shall be surface prepped and painted as above.

G. Mechanical

1. Design supply and installation of all conveyors shall conform to the latest edition of the Conveyor Equipment Manufacturers Association (CEMA).
2. The conveyor shall not be operated in the reverse direction.
3. Provide electrical supply needs
4. Provide NEMA design "C" or meet or exceed NEMA design "C" torque requirements. Provide HP
5. Belts
 - a. Belts shall be 72" wide
 - b. Base bid shall provide rubber (330 3 ply, minimum) or PVC (450 black, minimum) with a working load of 450 PIW, or other approved material.
 - c. Optional bid shall provide steel belt, submit specifications
6. Provide bearing, shafting, and sprocket specifications
7. Steel chutes shall be provided on pushing-side of conveyor to protect the leading edge of the tipping floor and prevent municipal solid waste from falling between the belt and pit wall. Chutes shall be made of continuous formed plate. Conveyor belt shall have at least 5'-1/2" of opening between the chute and backstop.
8. Steel backstop shall be provided for back side only. The backstop shall be at least 8'-6" above the conveyor elevation. The backstop shall also have a chute that prevents municipal solid waste from falling between the belt and pit wall. Conveyor belt shall have at least 5'-1/2" of opening between the chute and backstop.
9. Provide all electric and control specs
10. Provide emergency stop button per OSHA requirements

2.02 TOOLS AND SPARE PARTS

- A. Contractor shall supply all specialty tools and a spare parts kit for conveyor maintenance.

PART 3 EXECUTION

3.01 INSPECTION

- A. Contractor shall verify that structures and equipment are compatible. Make adjustments required to place system in proper operating condition.
- B. Assembly and Factory Test compactor prior to shipment to Customer.

3.02 INSTALLATION

- A. Manufacturer's representative shall check and approve the installation prior to operation. Manufacturer's representative shall field test and calibrate the equipment to assure the system operates to the Owner's satisfaction.
- B. Lubricate, adjust, test, and leave compactor in proper operation condition with all repairs made prior to leaving the site. All hydraulic oil and lubricants shall be provided as a part of this contract.
- C. Test operate compactor and conveyor in the presence of Engineer to demonstrate its ability to operate under maximum rated load, without vibration, jerking, slipping, overheating and to perform all functions satisfactorily. Test load a minimum of four trucks to ensure satisfactory operation.

3.03 FIELD QUALITY CONTROL

- A. Required Manufacturer's Services: Retain qualified factory-trained representatives of the compactor equipment manufacturer for a minimum period of 8 hours (total) to perform the following services. The manufacturer's representative shall check and approve their respective portion of the installation, supervise initial operation and testing in the presence of the Engineer and instruct the Owner's personnel in operation and maintenance of the equipment:

1. Equipment Installation:

- a. Oversee installation of the equipment and accessories specified herein.
 - b. Inspect the completed installation and note deficiencies.
 - 2. Start-up and Field Testing:
 - a. Be present and assist Contractor during start-up, adjusting, and field testing of completed installation, as outlined in 3.3.A.
 - b. Furnish test forms and procedures for field testing.
 - c. The manufacturer's representative shall revisit the jobsite as often as necessary until all trouble is corrected and the installation is completely satisfactory to the Engineer.
 - 3. Instruction of Operation and Maintenance Personnel:
 - a. Provide Operation and Maintenance training.
- B. Start-up and Field Testing:
- 1. Field test and calibrate equipment to demonstrate to the Owner's representative that all equipment will satisfactorily perform the functions and criteria specified in Part 2.
 - 2. Perform field tests as needed, to be witnessed by the Engineer, to verify operation under field conditions. The objective of these tests shall be to demonstrate that the overall system meets the requirements of the Contract Documents as well as to demonstrate its ability to operate under maximum rated load, without vibration, jerking, slipping, and overheating and to perform all functions satisfactorily. Tests shall involve the successful capacity loading of four trucks minimum. Then observe SWACO employee(s) operating the compactor for a minimum of a one-day period to ensure equipment is operated properly.
- C. Instruction of Operations and Maintenance Personnel:
- 1. Instruction Course: After equipment is fully operational, and before Owner will assume responsibility for the operation of equipment, the equipment manufacturer's operating specialists shall instruct the Owner's operating personnel in the care, maintenance, and proper operation of the equipment. Two training sessions shall be required. One shall consist of two (2) hours devoted to operations training and one shall consist of two (2) hours devoted to maintenance training.
 - 2. All training sessions may be videotaped by Owner.
 - 3. Training manuals shall be provided prior to training sessions.
- D. Manufacturer's Installation Report:
- 1. Prepare manufacturer's installation reports and submit within 30 days after completion of field testing and operation instruction. The reports shall include the following:
 - a. Field testing reports.
 - b. Description of installation deficiencies resolved to the Owner's satisfaction.

- c. Names of Owner personnel who attended the operations and maintenance training sessions.
- d. Record copy of materials used for the training sessions including an outline summary of the course.
- e. Signed equipment acceptance forms from the owner establishing the operational date of the compactor for warranty purposes.
- f. Spare parts acknowledgement forms for provided spare parts and manuals to the owner.

END OF SECTION

Exhibit B

004. Required Forms and Documents

I. Required Forms

- a) Bid with Bid Sheet and Bidder's Representative
- b) Non-Collusion Affidavit
- c) Non-Discrimination Affidavit
- d) Affidavit of Authority
- e) Delinquent Tax Affidavit
- f) W-9 Form (*Rev. March 2024 by the IRS*)
- g) Addendum Acknowledgement
- h) RFB Exceptions
- i) Acknowledgement (Local, Certified, EOE, and Green)

II. Required Documents from Bidder

- a) Bidder's Statement
- b) Bid Guaranty for Bid Bond
- c) Consent of Surety for Payment Bond

BID SHEET

To the Solid Waste Authority of Central Ohio (“SWACO”), Franklin County, Ohio, to provide the Project as outlined in this RFB and in accordance with the specifications provided; therefore, **EACH BIDDER MUST TAKE NOTICE OF THE FACT THAT EVEN THOUGH ITS BID MAY BE ACCEPTED AND THE DOCUMENTS SIGNED BY THE BIDDER TO WHOM AN AWARD IS MADE AND BY SWACO, THAT NO SUCH AWARD OR SIGNING BY SWACO SHALL BE CONSIDERED A BINDING CONTRACT WITHOUT THE PROPER CERTIFICATE BY THE FISCAL OFFICER OF SWACO INDICATING THAT FUNDS ARE AVAILABLE TO COVER THE COST OF THE WORK TO BE DONE, OR WITHOUT THE APPROVAL OF THE LEGAL COUNSEL OF SWACO AS TO THE FORM OF THE CONTRACT AND ALL THE PERTINENT DOCUMENTS RELATING THERETO HAVING BEEN APPROVED BY SAID LEGAL COUNSEL OF SWACO AND SUCH BIDDER IS HEREBY CHARGED WITH THIS NOTICE.**

The signer of the Bid, as Bidder, also declares that the only person, persons, company or parties interested in this Bid are named in this Bid, that he/she has carefully examined the advertisement, instructions to Bidders, General Conditions, sample contract documents, and all other documents related to this Bid as listed in the “Table of Contents” section of the Request for Bid package; that the Bidder or his/her representative has made such investigation as is necessary to determine the character and extent of the purchase and he/she proposes and agrees that if this Bid be accepted he/she will contract with SWACO to perform all necessary procedures in order to execute SWACO’s purchase within the time period set forth and according to the requirements of SWACO herein and hereinafter set forth for the following prices:

THE BIDDER’S LUMP SUM TOTALS BELOW ARE ITS TOTAL BIDS BASED ON UNIT PRICES. THESE FIGURES ARE FOR INFORMATION ONLY AT THE TIME OF OPENING BIDS. SWACO WILL MAKE THE TABULATION FROM THE UNIT PRICES. IF THERE IS AN ERROR IN THE LUMP SUM TOTAL BY THE BIDDER, IT SHALL BE CHANGED AS ONLY THE LUMP SUM PRICES SHALL GOVERN.

BID SHEET (CONTINUED)

This Bid is to provide the Project according to the information provided in the Request for Bid documents.

Company Name _____

Bid Tab

PAY ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	TOTAL
1	General Requirements and General Conditions	1	LS	
2	Remove & Replace Concrete Paving	1	LS	
3	Remove Fuel Island & Underground Tanks	1	LS	
4	Demolish Tipping Floor and Approach Apron	1	LS	
5	Install Tipping Floor • Construction of Conveyor Pit	1	LS	
6	Underground Utilities • Install Underground Detention and Sanitary Sewer • Install Storm Sewer	1	LS	
7	Building Improvements – West Building Expansion • Remove and Replace West Canopy • Partial West Wall Demolition • Fire Suppression • Concrete Push Wall	1	LS	
8	Electrical Installation	1	LS	
Subtotal (Pay Items 1 – 8)				\$ 0.00
9	Compactor & Conveyor Installation Allowance	1	Allowance	\$ 100,000.00
Total Lump Sum Bid (Pay Items 1 – 9)				\$0.00

Pricing to include all work as shown in design drawings. Successful Bidder to provide a schedule of values broken down in enough detail to satisfy SWACO prior to construction.

[Write out the Total Bid Amount below]

Submitted this _____ day of _____, 20____.

By: _____
Authorized Signature

Bidder's Representative

Contact Person for this Bid _____

Title _____

E-mail Address _____

Company Name _____

Mailing Address _____

City, State, Zip _____

Phone Number _____ Fax Number _____

Mobile Number _____

Attach additional paperwork if necessary.

If Bidder is:

An Individual

By: _____
(Individual's signature)

(Printed or typed name of individual)

Doing business as: _____

License or Registration Number: _____

Business Address: _____

Phone No. _____ Fax No.: _____

~ ~ ~ ~ ~

A Partnership

By: _____
(Firm name)

(General partner's signature)

(Printed or typed name of general partner) (Attach evidence of authority to sign.)

License or Registration Number: _____

Business Address: _____

Phone No. _____ Fax No.: _____

~ ~ ~ ~ ~

A Corporation

By: _____
(Corporation name)

(State of incorporation)

By: _____
(Signature of officer authorized to sign)

(Printed or typed name and title of officer authorized to sign. Attach evidence of authority to sign.)

(CORPORATE SEAL)

Attest: _____
(Secretary)

License or Registration Number: _____

Business Address: _____

Phone No. _____ Fax No.: _____

~~~~~

**Limited Liability Company**

By: \_\_\_\_\_  
(Firm name)

\_\_\_\_\_  
(State of formation)

By: \_\_\_\_\_  
(Signature of member authorized to sign)

\_\_\_\_\_  
(Printed /typed name and title of authorized member. Attach evidence of authority to sign.)

License or Registration Number: \_\_\_\_\_

Business Address: \_\_\_\_\_

Phone No. \_\_\_\_\_ Fax No.: \_\_\_\_\_

~~~~~

A Joint Venture

Joint Venture Name: _____

By: _____
(Signature)

(Printed or Typed Name)

(Title)

By: _____
(Signature)

(Printed or Typed Name)

(Title)

(Address)

Phone and fax number and address for receipt of communications to joint venture:

(Each joint venturer must sign. The manner of signing for each individual, partnership, corporation or limited liability company that is a party to the joint venture shall be in the manner indicated above).

++ END OF BID FORM ++

NON-DISCRIMINATION AFFIDAVIT

STATE OF _____)
) ss
COUNTY OF _____)

_____ being duly sworn, deposes and states that during the term
Affiant
and performance of any agreement or contract between the Solid Waste Authority of Central Ohio
and _____ (“Bidder”) that neither Bidder nor any
subcontractor of Bidder shall discriminate against any employee or qualified applicant for
employment who is both available and qualified for work because of age, race, color, religion, sex,
disability, creed, military status, or national origin. Further, Bidder agrees that neither it nor any
subcontractor shall discriminate based upon age, race, color, religion, sex, disability, creed,
military status, or national origin in any undertaking related to employment including, but not
limited to, such actions as hiring, upgrading, demotion or transfer, recruitment or recruitment
advertising, layoff or termination, rates of pay or other forms of compensation, and selection for
training, including apprenticeship.

Affiant's Signature

Affiant's Printed Name

Sworn to before me and subscribed in my presence this ____ day of _____, 20__.

Notary Public

My Commission Expires: _____
(Date)

(County)

(State)

NON-COLLUSION AFFIDAVIT

(This affidavit must be executed for the Bidder to be considered)

STATE OF _____)
) SS
COUNTY OF _____)

_____, being duly sworn, deposes and says that he/she is
(Name)

_____ of _____
(Title) (Company Name)

the party making the foregoing Bid; that such Bid is genuine and not collusive or sham; that said Bidder is not financially interested in, or otherwise affiliated in a business way with any other Bidder on the same contract; that said Bidder has not colluded, conspired, connived, or agreed, directly or indirectly with any Bidder or person, to put in a sham Bid, or that such other person shall refrain from submitting a Bid, and has not in any manner, directly or indirectly sought by agreement or collusion, or communication or conference, with any person to fix the Bid price of Affiant or any other Bidder, or to fix any overhead profit of cost element of said Bid price, or of that of any other Bidder, or to secure any advantage against Solid Waste Authority of Central Ohio, State of Ohio, or any person or persons interested in the proposed contract; and that all statements contained in this Bid are true; and further, that such Bidder has not, directly or indirectly, submitted this Bid or the contents thereof; or divulged information or data relative to any association or to any member or agent thereof.

Affiant

Sworn to before me and subscribed in my presence this _____ day of _____, 20_____.

Notary Public

My Commission Expires:

AFFIDAVIT OF AUTHORITY

STATE OF _____ }
_____ }SS
COUNTY OF _____ }

☐	Sole Proprietor ¹	☐	Limited Liability
☐	Partnership	☐	Company
☐	Corporation	☐	Partnership
☐	Single shareholder ¹	☐	Single Member ¹

¹ Fill in company name only, no need to fill out the affidavit.

_____, being duly sworn, deposes and says that he/she is the
Affiant's Name = Signs Affidavit

_____ of _____, organized
Title of Affiant Business Name

and existing under and by virtue of the laws of the State of _____, and having its principal office

at _____, _____
Principal office address City, State, Zip

says that he/she is familiar with the records, minute books and/or by-laws of the corporation, partnership

agreement or operating agreement of the LLP or LLC named _____. Affiant
Business Name

further says that _____, as _____ of the
Person signing contract, NOT AFFIANT Title

corporation, partnership, LLP, or LLC is duly authorized to sign the contract for Goods and/or Services on

behalf of said Corporation, Partnership, LLP, or LLC by virtue of² _____.

² If Corporation, state whether by virtue of a provision of the By-laws or Board Resolution with date of adoption.
If LLP, State whether by virtue of Resolution (give date of adoption) or by virtue of the Operating Agreement.
If LLC, state whether by virtue of Resolution with date of adoption or by virtue of the Operating Agreement

Sworn to before me and subscribed in my presence this
_____ day of _____, 20_____.

Affiant's Signature

(Seal) Notary Public

Affiant's Printed Name

My Commission Expires:

Date _____

County _____, State _____

DELINQUENT TAX AFFIDAVIT

STATE OF _____)
) SS
COUNTY OF _____)

_____, being duly sworn, deposes and says that he/she is _____
(Name) (Title)
of _____ with offices located at _____
(Company Name) (Company Address)

and as its duly authorized representative states that effective this _____ day of _____, 20____,

(Company Name)

- ☐ Is not charged with delinquent taxes of the State or a county in which the Solid Waste Authority of Central Ohio has territory.
- ☐ Is charged with delinquent taxes of the State or a county in which the Solid Waste Authority of Central Ohio has territory, and that the amount of such due and unpaid delinquent taxes, penalties and interest thereon is as follows:

<u>Taxes</u>	<u>Penalties & Interest</u>	<u>County</u>
\$ _____	\$ _____	_____
\$ _____	\$ _____	_____
\$ _____	\$ _____	_____

Affiant
Sworn to before me and subscribed in my presence this _____ day of _____, 20____.

Notary Public
My Commission Expires:

Date

County State

**Request for Taxpayer
Identification Number and Certification**

Go to www.irs.gov/FormW9 for instructions and the latest information.

**Give form to the
requester. Do not
send to the IRS.**

Before you begin. For guidance related to the purpose of Form W-9, see *Purpose of Form*, below.

Print or type. See Specific Instructions on page 3.	1 Name of entity/individual. An entry is required. (For a sole proprietor or disregarded entity, enter the owner's name on line 1, and enter the business/disregarded entity's name on line 2.)	
	2 Business name/disregarded entity name, if different from above.	
	3a Check the appropriate box for federal tax classification of the entity/individual whose name is entered on line 1. Check only one of the following seven boxes. ☐ Individual/sole proprietor ☐ C corporation ☐ S corporation ☐ Partnership ☐ Trust/estate ☐ LLC. Enter the tax classification (C = C corporation, S = S corporation, P = Partnership) _____ Note: Check the "LLC" box above and, in the entry space, enter the appropriate code (C, S, or P) for the tax classification of the LLC, unless it is a disregarded entity. A disregarded entity should instead check the appropriate box for the tax classification of its owner. ☐ Other (see instructions) _____	
	4 Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3): Exempt payee code (if any) _____ Exemption from Foreign Account Tax Compliance Act (FATCA) reporting code (if any) _____ (Applies to accounts maintained outside the United States.)	
	3b If on line 3a you checked "Partnership" or "Trust/estate," or checked "LLC" and entered "P" as its tax classification, and you are providing this form to a partnership, trust, or estate in which you have an ownership interest, check this box if you have any foreign partners, owners, or beneficiaries. See instructions ☐	
	5 Address (number, street, and apt. or suite no.). See instructions.	Requester's name and address (optional)
	6 City, state, and ZIP code	
7 List account number(s) here (optional)		

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

Note: If the account is in more than one name, see the instructions for line 1. See also *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Social security number									
			-			-			
or									
Employer identification number									
			-						

Part II Certification

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
- I am not subject to backup withholding because (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
- I am a U.S. citizen or other U.S. person (defined below); and
- The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and, generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Sign Here	Signature of U.S. person	Date

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to www.irs.gov/FormW9.

What's New

Line 3a has been modified to clarify how a disregarded entity completes this line. An LLC that is a disregarded entity should check the appropriate box for the tax classification of its owner. Otherwise, it should check the "LLC" box and enter its appropriate tax classification.

New line 3b has been added to this form. A flow-through entity is required to complete this line to indicate that it has direct or indirect foreign partners, owners, or beneficiaries when it provides the Form W-9 to another flow-through entity in which it has an ownership interest. This change is intended to provide a flow-through entity with information regarding the status of its indirect foreign partners, owners, or beneficiaries, so that it can satisfy any applicable reporting requirements. For example, a partnership that has any indirect foreign partners may be required to complete Schedules K-2 and K-3. See the Partnership Instructions for Schedules K-2 and K-3 (Form 1065).

Purpose of Form

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS is giving you this form because they

must obtain your correct taxpayer identification number (TIN), which may be your social security number (SSN), individual taxpayer identification number (ITIN), adoption taxpayer identification number (ATIN), or employer identification number (EIN), to report on an information return the amount paid to you, or other amount reportable on an information return. Examples of information returns include, but are not limited to, the following.

- Form 1099-INT (interest earned or paid).
- Form 1099-DIV (dividends, including those from stocks or mutual funds).
- Form 1099-MISC (various types of income, prizes, awards, or gross proceeds).
- Form 1099-NEC (nonemployee compensation).
- Form 1099-B (stock or mutual fund sales and certain other transactions by brokers).
- Form 1099-S (proceeds from real estate transactions).
- Form 1099-K (merchant card and third-party network transactions).
- Form 1098 (home mortgage interest), 1098-E (student loan interest), and 1098-T (tuition).
- Form 1099-C (canceled debt).
- Form 1099-A (acquisition or abandonment of secured property).

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN.

Caution: If you don't return Form W-9 to the requester with a TIN, you might be subject to backup withholding. See *What is backup withholding*, later.

By signing the filled-out form, you:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued);
2. Certify that you are not subject to backup withholding; or
3. Claim exemption from backup withholding if you are a U.S. exempt payee; and
4. Certify to your non-foreign status for purposes of withholding under chapter 3 or 4 of the Code (if applicable); and
5. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting is correct. See *What Is FATCA Reporting*, later, for further information.

Note: If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien;
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States;
- An estate (other than a foreign estate); or
- A domestic trust (as defined in Regulations section 301.7701-7).

Establishing U.S. status for purposes of chapter 3 and chapter 4 withholding. Payments made to foreign persons, including certain distributions, allocations of income, or transfers of sales proceeds, may be subject to withholding under chapter 3 or chapter 4 of the Code (sections 1441–1474). Under those rules, if a Form W-9 or other certification of non-foreign status has not been received, a withholding agent, transferee, or partnership (payor) generally applies presumption rules that may require the payor to withhold applicable tax from the recipient, owner, transferor, or partner (payee). See Pub. 515, *Withholding of Tax on Nonresident Aliens and Foreign Entities*.

The following persons must provide Form W-9 to the payor for purposes of establishing its non-foreign status.

- In the case of a disregarded entity with a U.S. owner, the U.S. owner of the disregarded entity and not the disregarded entity.
- In the case of a grantor trust with a U.S. grantor or other U.S. owner, generally, the U.S. grantor or other U.S. owner of the grantor trust and not the grantor trust.
- In the case of a U.S. trust (other than a grantor trust), the U.S. trust and not the beneficiaries of the trust.

See Pub. 515 for more information on providing a Form W-9 or a certification of non-foreign status to avoid withholding.

Foreign person. If you are a foreign person or the U.S. branch of a foreign bank that has elected to be treated as a U.S. person (under Regulations section 1.1441-1(b)(2)(iv) or other applicable section for chapter 3 or 4 purposes), do not use Form W-9. Instead, use the appropriate Form W-8 or Form 8233 (see Pub. 515). If you are a qualified foreign pension fund under Regulations section 1.897(l)-1(d), or a partnership that is wholly owned by qualified foreign pension funds, that is treated as a non-foreign person for purposes of section 1445 withholding, do not use Form W-9. Instead, use Form W-8EXP (or other certification of non-foreign status).

Nonresident alien who becomes a resident alien. Generally, only a nonresident alien individual may use the terms of a tax treaty to reduce or eliminate U.S. tax on certain types of income. However, most tax treaties contain a provision known as a saving clause. Exceptions specified in the saving clause may permit an exemption from tax to continue for certain types of income even after the payee has otherwise become a U.S. resident alien for tax purposes.

If you are a U.S. resident alien who is relying on an exception contained in the saving clause of a tax treaty to claim an exemption from U.S. tax on certain types of income, you must attach a statement to Form W-9 that specifies the following five items.

1. The treaty country. Generally, this must be the same treaty under which you claimed exemption from tax as a nonresident alien.
2. The treaty article addressing the income.
3. The article number (or location) in the tax treaty that contains the saving clause and its exceptions.
4. The type and amount of income that qualifies for the exemption from tax.
5. Sufficient facts to justify the exemption from tax under the terms of the treaty article.

Example. Article 20 of the U.S.-China income tax treaty allows an exemption from tax for scholarship income received by a Chinese student temporarily present in the United States. Under U.S. law, this student will become a resident alien for tax purposes if their stay in the United States exceeds 5 calendar years. However, paragraph 2 of the first Protocol to the U.S.-China treaty (dated April 30, 1984) allows the provisions of Article 20 to continue to apply even after the Chinese student becomes a resident alien of the United States. A Chinese student who qualifies for this exception (under paragraph 2 of the first Protocol) and is relying on this exception to claim an exemption from tax on their scholarship or fellowship income would attach to Form W-9 a statement that includes the information described above to support that exemption.

If you are a nonresident alien or a foreign entity, give the requester the appropriate completed Form W-8 or Form 8233.

Backup Withholding

What is backup withholding? Persons making certain payments to you must under certain conditions withhold and pay to the IRS 24% of such payments. This is called “backup withholding.” Payments that may be subject to backup withholding include, but are not limited to, interest, tax-exempt interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, payments made in settlement of payment card and third-party network transactions, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

You will not be subject to backup withholding on payments you receive if you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return.

Payments you receive will be subject to backup withholding if:

1. You do not furnish your TIN to the requester;
2. You do not certify your TIN when required (see the instructions for Part II for details);
3. The IRS tells the requester that you furnished an incorrect TIN;
4. The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends on your tax return (for reportable interest and dividends only); or
5. You do not certify to the requester that you are not subject to backup withholding, as described in item 4 under “*By signing the filled-out form*” above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See *Exempt payee code*, later, and the separate Instructions for the Requester of Form W-9 for more information.

See also *Establishing U.S. status for purposes of chapter 3 and chapter 4 withholding*, earlier.

What Is FATCA Reporting?

The Foreign Account Tax Compliance Act (FATCA) requires a participating foreign financial institution to report all U.S. account holders that are specified U.S. persons. Certain payees are exempt from FATCA reporting. See *Exemption from FATCA reporting code*, later, and the Instructions for the Requester of Form W-9 for more information.

Updating Your Information

You must provide updated information to any person to whom you claimed to be an exempt payee if you are no longer an exempt payee and anticipate receiving reportable payments in the future from this person. For example, you may need to provide updated information if you are a C corporation that elects to be an S corporation, or if you are no longer tax exempt. In addition, you must furnish a new Form W-9 if the name or TIN changes for the account, for example, if the grantor of a grantor trust dies.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Line 1

You must enter one of the following on this line; **do not** leave this line blank. The name should match the name on your tax return.

If this Form W-9 is for a joint account (other than an account maintained by a foreign financial institution (FFI)), list first, and then circle, the name of the person or entity whose number you entered in Part I of Form W-9. If you are providing Form W-9 to an FFI to document a joint account, each holder of the account that is a U.S. person must provide a Form W-9.

• **Individual.** Generally, enter the name shown on your tax return. If you have changed your last name without informing the Social Security Administration (SSA) of the name change, enter your first name, the last name as shown on your social security card, and your new last name.

Note for ITIN applicant: Enter your individual name as it was entered on your Form W-7 application, line 1a. This should also be the same as the name you entered on the Form 1040 you filed with your application.

• **Sole proprietor.** Enter your individual name as shown on your Form 1040 on line 1. Enter your business, trade, or “doing business as” (DBA) name on line 2.

• **Partnership, C corporation, S corporation, or LLC, other than a disregarded entity.** Enter the entity’s name as shown on the entity’s tax return on line 1 and any business, trade, or DBA name on line 2.

• **Other entities.** Enter your name as shown on required U.S. federal tax documents on line 1. This name should match the name shown on the charter or other legal document creating the entity. Enter any business, trade, or DBA name on line 2.

• **Disregarded entity.** In general, a business entity that has a single owner, including an LLC, and is not a corporation, is disregarded as an entity separate from its owner (a disregarded entity). See Regulations section 301.7701-2(c)(2). A disregarded entity should check the appropriate box for the tax classification of its owner. Enter the owner’s name on line 1. The name of the owner entered on line 1 should never be a disregarded entity. The name on line 1 should be the name shown on the income tax return on which the income should be reported. For

example, if a foreign LLC that is treated as a disregarded entity for U.S. federal tax purposes has a single owner that is a U.S. person, the U.S. owner’s name is required to be provided on line 1. If the direct owner of the entity is also a disregarded entity, enter the first owner that is not disregarded for federal tax purposes. Enter the disregarded entity’s name on line 2. If the owner of the disregarded entity is a foreign person, the owner must complete an appropriate Form W-8 instead of a Form W-9. This is the case even if the foreign person has a U.S. TIN.

Line 2

If you have a business name, trade name, DBA name, or disregarded entity name, enter it on line 2.

Line 3a

Check the appropriate box on line 3a for the U.S. federal tax classification of the person whose name is entered on line 1. Check only one box on line 3a.

IF the entity/individual on line 1 is a(n) . . .	THEN check the box for . . .
• Corporation	Corporation.
• Individual or • Sole proprietorship	Individual/sole proprietor.
• LLC classified as a partnership for U.S. federal tax purposes or • LLC that has filed Form 8832 or 2553 electing to be taxed as a corporation	Limited liability company and enter the appropriate tax classification: P = Partnership, C = C corporation, or S = S corporation.
• Partnership	Partnership.
• Trust/estate	Trust/estate.

Line 3b

Check this box if you are a partnership (including an LLC classified as a partnership for U.S. federal tax purposes), trust, or estate that has any foreign partners, owners, or beneficiaries, and you are providing this form to a partnership, trust, or estate, in which you have an ownership interest. You must check the box on line 3b if you receive a Form W-8 (or documentary evidence) from any partner, owner, or beneficiary establishing foreign status or if you receive a Form W-9 from any partner, owner, or beneficiary that has checked the box on line 3b.

Note: A partnership that provides a Form W-9 and checks box 3b may be required to complete Schedules K-2 and K-3 (Form 1065). For more information, see the Partnership Instructions for Schedules K-2 and K-3 (Form 1065).

If you are required to complete line 3b but fail to do so, you may not receive the information necessary to file a correct information return with the IRS or furnish a correct payee statement to your partners or beneficiaries. See, for example, sections 6698, 6722, and 6724 for penalties that may apply.

Line 4 Exemptions

If you are exempt from backup withholding and/or FATCA reporting, enter in the appropriate space on line 4 any code(s) that may apply to you.

Exempt payee code.

- Generally, individuals (including sole proprietors) are not exempt from backup withholding.
- Except as provided below, corporations are exempt from backup withholding for certain payments, including interest and dividends.
- Corporations are not exempt from backup withholding for payments made in settlement of payment card or third-party network transactions.
- Corporations are not exempt from backup withholding with respect to attorneys’ fees or gross proceeds paid to attorneys, and corporations that provide medical or health care services are not exempt with respect to payments reportable on Form 1099-MISC.

The following codes identify payees that are exempt from backup withholding. Enter the appropriate code in the space on line 4.

1—An organization exempt from tax under section 501(a), any IRA, or a custodial account under section 403(b)(7) if the account satisfies the requirements of section 401(f)(2).

- 2—The United States or any of its agencies or instrumentalities.
- 3—A state, the District of Columbia, a U.S. commonwealth or territory, or any of their political subdivisions or instrumentalities.
- 4—A foreign government or any of its political subdivisions, agencies, or instrumentalities.
- 5—A corporation.
- 6—A dealer in securities or commodities required to register in the United States, the District of Columbia, or a U.S. commonwealth or territory.
- 7—A futures commission merchant registered with the Commodity Futures Trading Commission.
- 8—A real estate investment trust.
- 9—An entity registered at all times during the tax year under the Investment Company Act of 1940.
- 10—A common trust fund operated by a bank under section 584(a).
- 11—A financial institution as defined under section 581.
- 12—A middleman known in the investment community as a nominee or custodian.
- 13—A trust exempt from tax under section 664 or described in section 4947.

The following chart shows types of payments that may be exempt from backup withholding. The chart applies to the exempt payees listed above, 1 through 13.

IF the payment is for . . .	THEN the payment is exempt for . . .
• Interest and dividend payments	All exempt payees except for 7.
• Broker transactions	Exempt payees 1 through 4 and 6 through 11 and all C corporations. S corporations must not enter an exempt payee code because they are exempt only for sales of noncovered securities acquired prior to 2012.
• Barter exchange transactions and patronage dividends	Exempt payees 1 through 4.
• Payments over \$600 required to be reported and direct sales over \$5,000 ¹	Generally, exempt payees 1 through 5. ²
• Payments made in settlement of payment card or third-party network transactions	Exempt payees 1 through 4.

¹ See Form 1099-MISC, Miscellaneous Information, and its instructions.

² However, the following payments made to a corporation and reportable on Form 1099-MISC are not exempt from backup withholding: medical and health care payments, attorneys' fees, gross proceeds paid to an attorney reportable under section 6045(f), and payments for services paid by a federal executive agency.

Exemption from FATCA reporting code. The following codes identify payees that are exempt from reporting under FATCA. These codes apply to persons submitting this form for accounts maintained outside of the United States by certain foreign financial institutions. Therefore, if you are only submitting this form for an account you hold in the United States, you may leave this field blank. Consult with the person requesting this form if you are uncertain if the financial institution is subject to these requirements. A requester may indicate that a code is not required by providing you with a Form W-9 with "Not Applicable" (or any similar indication) entered on the line for a FATCA exemption code.

A—An organization exempt from tax under section 501(a) or any individual retirement plan as defined in section 7701(a)(37).

B—The United States or any of its agencies or instrumentalities.

C—A state, the District of Columbia, a U.S. commonwealth or territory, or any of their political subdivisions or instrumentalities.

D—A corporation the stock of which is regularly traded on one or more established securities markets, as described in Regulations section 1.1472-1(c)(1)(i).

E—A corporation that is a member of the same expanded affiliated group as a corporation described in Regulations section 1.1472-1(c)(1)(i).

F—A dealer in securities, commodities, or derivative financial instruments (including notional principal contracts, futures, forwards, and options) that is registered as such under the laws of the United States or any state.

G—A real estate investment trust.

H—A regulated investment company as defined in section 851 or an entity registered at all times during the tax year under the Investment Company Act of 1940.

I—A common trust fund as defined in section 584(a).

J—A bank as defined in section 581.

K—A broker.

L—A trust exempt from tax under section 664 or described in section 4947(a)(1).

M—A tax-exempt trust under a section 403(b) plan or section 457(g) plan.

Note: You may wish to consult with the financial institution requesting this form to determine whether the FATCA code and/or exempt payee code should be completed.

Line 5

Enter your address (number, street, and apartment or suite number). This is where the requester of this Form W-9 will mail your information returns. If this address differs from the one the requester already has on file, enter "NEW" at the top. If a new address is provided, there is still a chance the old address will be used until the payor changes your address in their records.

Line 6

Enter your city, state, and ZIP code.

Part I. Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. If you are a resident alien and you do not have, and are not eligible to get, an SSN, your TIN is your IRS ITIN. Enter it in the entry space for the Social security number. If you do not have an ITIN, see *How to get a TIN* below.

If you are a sole proprietor and you have an EIN, you may enter either your SSN or EIN.

If you are a single-member LLC that is disregarded as an entity separate from its owner, enter the owner's SSN (or EIN, if the owner has one). If the LLC is classified as a corporation or partnership, enter the entity's EIN.

Note: See *What Name and Number To Give the Requester*, later, for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get Form SS-5, Application for a Social Security Card, from your local SSA office or get this form online at www.SSA.gov. You may also get this form by calling 800-772-1213. Use Form W-7, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN, or Form SS-4, Application for Employer Identification Number, to apply for an EIN. You can apply for an EIN online by accessing the IRS website at www.irs.gov/EIN. Go to www.irs.gov/Forms to view, download, or print Form W-7 and/or Form SS-4. Or, you can go to www.irs.gov/OrderForms to place an order and have Form W-7 and/or Form SS-4 mailed to you within 15 business days.

If you are asked to complete Form W-9 but do not have a TIN, apply for a TIN and enter "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, you will generally have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments. The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Entering "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon. See also *Establishing U.S. status for purposes of chapter 3 and chapter 4 withholding*, earlier, for when you may instead be subject to withholding under chapter 3 or 4 of the Code.

Caution: A disregarded U.S. entity that has a foreign owner must use the appropriate Form W-8.

Part II. Certification

To establish to the withholding agent that you are a U.S. person, or resident alien, sign Form W-9. You may be requested to sign by the withholding agent even if item 1, 4, or 5 below indicates otherwise.

For a joint account, only the person whose TIN is shown in Part I should sign (when required). In the case of a disregarded entity, the person identified on line 1 must sign. Exempt payees, see *Exempt payee code*, earlier.

Signature requirements. Complete the certification as indicated in items 1 through 5 below.

1. Interest, dividend, and barter exchange accounts opened before 1984 and broker accounts considered active during 1983. You must give your correct TIN, but you do not have to sign the certification.

2. Interest, dividend, broker, and barter exchange accounts opened after 1983 and broker accounts considered inactive during 1983. You must sign the certification or backup withholding will apply. If you are subject to backup withholding and you are merely providing your correct TIN to the requester, you must cross out item 2 in the certification before signing the form.

3. Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

4. Other payments. You must give your correct TIN, but you do not have to sign the certification unless you have been notified that you have previously given an incorrect TIN. "Other payments" include payments made in the course of the requester's trade or business for rents, royalties, goods (other than bills for merchandise), medical and health care services (including payments to corporations), payments to a nonemployee for services, payments made in settlement of payment card and third-party network transactions, payments to certain fishing boat crew members and fishermen, and gross proceeds paid to attorneys (including payments to corporations).

5. Mortgage interest paid by you, acquisition or abandonment of secured property, cancellation of debt, qualified tuition program payments (under section 529), ABLE accounts (under section 529A), IRA, Coverdell ESA, Archer MSA or HSA contributions or distributions, and pension distributions. You must give your correct TIN, but you do not have to sign the certification.

What Name and Number To Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account) other than an account maintained by an FFI	The actual owner of the account or, if combined funds, the first individual on the account ¹
3. Two or more U.S. persons (joint account maintained by an FFI)	Each holder of the account
4. Custodial account of a minor (Uniform Gift to Minors Act)	The minor ²
5. a. The usual revocable savings trust (grantor is also trustee)	The grantor-trustee ¹
b. So-called trust account that is not a legal or valid trust under state law	The actual owner ¹
6. Sole proprietorship or disregarded entity owned by an individual	The owner ³
7. Grantor trust filing under Optional Filing Method 1 (see Regulations section 1.671-4(b)(2)(i)(A))**	The grantor*

For this type of account:	Give name and EIN of:
8. Disregarded entity not owned by an individual	The owner
9. A valid trust, estate, or pension trust	Legal entity ⁴
10. Corporation or LLC electing corporate status on Form 8832 or Form 2553	The corporation
11. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
12. Partnership or multi-member LLC	The partnership
13. A broker or registered nominee	The broker or nominee
14. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity
15. Grantor trust filing Form 1041 or under the Optional Filing Method 2, requiring Form 1099 (see Regulations section 1.671-4(b)(2)(i)(B))**	The trust

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name on line 1, and enter your business or DBA name, if any, on line 2. You may use either your SSN or EIN (if you have one), but the IRS encourages you to use your SSN.

⁴ List first and circle the name of the trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.)

* **Note:** The grantor must also provide a Form W-9 to the trustee of the trust.

** For more information on optional filing methods for grantor trusts, see the Instructions for Form 1041.

Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

Secure Your Tax Records From Identity Theft

Identity theft occurs when someone uses your personal information, such as your name, SSN, or other identifying information, without your permission to commit fraud or other crimes. An identity thief may use your SSN to get a job or may file a tax return using your SSN to receive a refund.

To reduce your risk:

- Protect your SSN,
- Ensure your employer is protecting your SSN, and
- Be careful when choosing a tax return preparer.

If your tax records are affected by identity theft and you receive a notice from the IRS, respond right away to the name and phone number printed on the IRS notice or letter.

If your tax records are not currently affected by identity theft but you think you are at risk due to a lost or stolen purse or wallet, questionable credit card activity, or a questionable credit report, contact the IRS Identity Theft Hotline at 800-908-4490 or submit Form 14039.

For more information, see Pub. 5027, Identity Theft Information for Taxpayers.

Victims of identity theft who are experiencing economic harm or a systemic problem, or are seeking help in resolving tax problems that have not been resolved through normal channels, may be eligible for Taxpayer Advocate Service (TAS) assistance. You can reach TAS by calling the TAS toll-free case intake line at 877-777-4778 or TTY/TDD 800-829-4059.

Protect yourself from suspicious emails or phishing schemes.

Phishing is the creation and use of email and websites designed to mimic legitimate business emails and websites. The most common act is sending an email to a user falsely claiming to be an established legitimate enterprise in an attempt to scam the user into surrendering private information that will be used for identity theft.

The IRS does not initiate contacts with taxpayers via emails. Also, the IRS does not request personal detailed information through email or ask taxpayers for the PIN numbers, passwords, or similar secret access information for their credit card, bank, or other financial accounts.

If you receive an unsolicited email claiming to be from the IRS, forward this message to phishing@irs.gov. You may also report misuse of the IRS name, logo, or other IRS property to the Treasury Inspector General for Tax Administration (TIGTA) at 800-366-4484. You can forward suspicious emails to the Federal Trade Commission at spam@uce.gov or report them at www.ftc.gov/complaint. You can contact the FTC at www.ftc.gov/idtheft or 877-IDTHEFT (877-438-4338). If you have been the victim of identity theft, see www.IdentityTheft.gov and Pub. 5027.

Go to www.irs.gov/IdentityTheft to learn more about identity theft and how to reduce your risk.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to provide your correct TIN to persons (including federal agencies) who are required to file information returns with the IRS to report interest, dividends, or certain other income paid to you; mortgage interest you paid; the acquisition or abandonment of secured property; the cancellation of debt; or contributions you made to an IRA, Archer MSA, or HSA. The person collecting this form uses the information on the form to file information returns with the IRS, reporting the above information. Routine uses of this information include giving it to the Department of Justice for civil and criminal litigation and to cities, states, the District of Columbia, and U.S. commonwealths and territories for use in administering their laws. The information may also be disclosed to other countries under a treaty, to federal and state agencies to enforce civil and criminal laws, or to federal law enforcement and intelligence agencies to combat terrorism. You must provide your TIN whether or not you are required to file a tax return. Under section 3406, payors must generally withhold a percentage of taxable interest, dividends, and certain other payments to a payee who does not give a TIN to the payor. Certain penalties may also apply for providing false or fraudulent information.

ADDENDA ACKNOWLEDGEMENT

FEDERAL I.D. NO. _____

The undersigned hereby acknowledges receipt and acceptance of the following Addenda and further acknowledges that the provisions of each addendum have been included in the preparation of this Bid.

ADDENDA RECEIVED

DATE RECEIVED

SIGNATURE

Addendum # _____

Addendum # _____

Addendum # _____

Respectfully submitted:

Printed name

Printed title

Company

City

State

Zip

Date acknowledgement submitted to SWACO _____

SEAL (if BID is by a Corporation)

RFB Exceptions

Bidder's Name: _____

List any exceptions to the RFB below, including the Sample Contract. Provide a summary discussion of reasons for proposed exceptions and include any proposed alternative language. Any exceptions to the RFB will be considered and included in SWACO's evaluation. SWACO is not obligated to accept the requested exceptions, but failure to list the exception will prevent Bidder from raising it during contract negotiations.

List Exceptions Below.

Local, Certified, Equal Opportunity, and Green

SWACO is interested in contracting with companies that either meet the Local, Certified Business, Equal Opportunity Employer, and/or Environmentally Friendly classification descriptions below, and/or companies that have supplier equality programs that encompass local and/or certified companies. Please read each description below and complete the Acknowledgment form.

Local Business – Local businesses that meet the eligibility requirements as stated in the following paragraphs below, qualify as a Local Vendor:

- i. a domestic corporation, sole proprietorship, partnership, or joint venture that has its principal place of business located within Franklin County, Ohio or a county contiguous to Franklin County, Ohio ("Contiguous County") as registered in official documents filed with the Secretary of State, State of Ohio or the Franklin County Ohio recorder's office or a Contiguous County's recorder's office; or
- ii. a domestic corporation, sole proprietorship, partnership, or joint venture that holds a valid vendor's license which indicates its principal place of business is located within Franklin County or Contiguous County; or
- iii. a domestic corporation, sole proprietorship, partnership, or joint venture that employs more than 100 employees in Franklin County, Ohio and/or a county contiguous to Franklin County, Ohio; or
- iv. a domestic corporation, sole proprietorship, partnership, or joint venture that has more than fifty percent (50%) of its total employment located within Franklin County, Ohio and/or a county contiguous to Franklin County, Ohio.

Certified Business – Any business who is certified through any of the following certification programs are considered a Certified Business:

- i. City of Columbus; or
- ii. State of Ohio's Minority Business Enterprise (MBE), Veteran Business Enterprise (VBE), Women Business Enterprise (WBE), Minority Women Business Enterprise (MWBE), LGBT Business Enterprise (LGBTBE), Small Business Enterprise (SBE); or
- iii. Encouraging Diversity Growth and Equity (EDGE) program; or
- iv. Federal Disadvantaged Business Enterprise (DBE) program.

Equal Opportunity Employer – A business that agrees not to discriminate against any employee or job applicant because of race, color, religion, national origin, military status, sex, physical or mental disability, or age and has implemented equal opportunity employment practices in place.

Green/Environmentally Friendly – A business that has a verified green business program in place that reduces or minimizes the impact of waste, causing no harm to ecosystems or the environment. Vendors must provide documentation of the Green Business program to qualify as Environmentally Friendly, such as the GreenSpot Certificate of Membership from The City of Columbus.

**** If you qualify as a Local, Certified, Equal Opportunity, or Environmentally Friendly business, as described, please include supporting documentation affirming said characteristic and include with the *Acknowledgement* form:**

ACKNOWLEDGEMENT

Thank you for your interest in SWACO! As a government agency, SWACO is requesting the additional information below to assist in delivering transparency and fairness to vendors by identifying contractor characteristics. The information you supply assists SWACO in promoting equitable practices and aligns with SWACO's Guiding Principles (<https://www.swaco.org/182/Vision-Mission-Goals>).

Please review the classifications below, check the appropriate box, and **attach** any certifications, evidence of being a Local or Certified business, an Equal Opportunity Employer, and/or Environmentally Friendly.

Local Business

Any contractor / business that is a domestic corporation, sole proprietorship, partnership, or joint venture that has its principal place of business located within Franklin County, Ohio or a county contiguous to Franklin County, Ohio ("Contiguous County") and that Vendor...

- ☐ has filed its official documents with the Secretary of State, State of Ohio or the Franklin County Ohio recorder's office or a Contiguous County's recorder's office.
- ☐ holds a valid vendor's license which indicates its principal place of business is located within Franklin County or Contiguous County.
- ☐ employs more than one hundred (100) employees in Franklin County, Ohio and/or a county contiguous to Franklin County, Ohio.
- ☐ has more than fifty percent (50%) of its total employment located within Franklin County, Ohio and/or a county contiguous to Franklin County, Ohio.

Certified Business

Any contractor / business that is certified through one of the following programs:

- ☐ Certified through the City of Columbus.
- ☐ State of Ohio's Minority Business Enterprise (MBE), Encouraging Diversity Growth and Equity (EDGE), Veteran Business Enterprise (VBE), Women Business Enterprise (WBE), Minority Women Business Enterprise (MWBE), LGBT Business Enterprise (LGBTBE), Small Business Enterprise (SBE), or Federal Disadvantaged Business Enterprise (DBE).

Equal Opportunity Employer

- ☐ A contractor / business that agrees not to discriminate against any employee or job applicant because of race, color, religion, national origin, military status, sex, physical or mental disability, or age and has implemented equal opportunity employment practices in place.

Environmentally Friendly

- ☐ A contractor / business that has a verified green business program in place that reduces or minimizes the impact of waste, causing no harm to ecosystems or the environment. Vendors must provide documentation of the Green Business program to qualify as Environmentally Friendly, such as the GreenSpot Certificate of Membership from The City of Columbus.

None

- ☐ Vendor is not a Local Business, Certified Business, Equal Opportunity Employer, or Environmentally Friendly.

Printed Vendor Name

Representative's E-Mail Address

Vendor Representative's Signature

Representative's Telephone Number

Printed Vendor Representative's Name

Exhibit C

Sample Contract and Sample Contract Forms

Sample Contract

The following Sample Contract contains SWACO's standard terms and conditions provided for review.

Any exceptions to the RFB or this Sample Contract must be noted in the ***Exceptions to RFB*** form included with the Required Forms in Exhibit B.

Solid Waste Authority of Central Ohio
Contract for [PROJECT]

This Contract for [PROJECT] ("Contract") is entered into by and between the Solid Waste Authority of Central Ohio ("SWACO"), a regional solid waste authority established pursuant to Ohio Revised Code Section 343.011, and [CONTRACTOR] ("Contractor"), with a business address of [CONTRACTOR'S ADDRESS], collectively the "Parties," pursuant to SWACO's Procurement Policy.

WHEREAS, it is the intention of SWACO to obtain the services of Contractor for the [PROJECT NAME] ("Project"); and

WHEREAS, SWACO has received several Bids for the Project and has determined that Contractor has submitted the lowest and best responsive Bid for the Project; and

WHEREAS, SWACO has determined that Contractor shall be awarded the Contract for the provision of services for the Project; and

WHEREAS, Contractor shall provide all labor, equipment, and materials necessary for the performance of the Work of the Project.

NOW, THEREFORE, in consideration of the mutual promises herein contained, SWACO and Contractor agree as follows:

ARTICLE I
GENERAL TERMS

1.1. **Definition of Contract Documents.** The Contract Documents establish the rights and obligations of the Parties and include the Request for Bid for the [PROJECT], and all related drawings or materials issued ("Bid Documents"), the Notice to Proceed, the Bonds, the General Conditions of the Contract for Construction (dated April 8, 2016) (hereinafter "General Conditions"), as well as any subsequently issued Addenda which pertain to the Contract Documents or Bid Documents, the Supplementary Conditions, and the Specifications and Drawings, as said are more specifically identified in this Contract or elsewhere in the Contract Documents, copies of all of which are attached hereto as **Exhibit A** and incorporated herein as if fully rewritten; Contractor's Bid, including documentation accompanying the Bid and any post Bid documentation submitted prior to the notice of award, a copy of which is attached hereto as **Exhibit B**; all Change Orders, Field Orders, the Project Engineer's written interpretations and clarifications issued on or after the effective date of the Contract; and all other documents designated by SWACO or the Project Engineer as Contract Documents. Approved Shop Drawings and the reports and drawings of subsurface and physical conditions are not Contract Documents. Only printed or hard copies of the items listed in this paragraph are Contract Documents. Files in electronic media format or text, data, graphics, and the like that may be furnished by SWACO to Contractor are not Contract Documents.

1.2. Terms of the Contract. The Contract Documents are each incorporated into this Contract as if fully rewritten herein.

1.3. Definitions. Any word, term, or phrase contained in this Contract shall have the same meaning as that set forth in the General Conditions. All terms or words not otherwise defined shall be defined pursuant to their ordinary meaning or, if such term or word has a special meaning or usage in the engineering or construction trades, pursuant to that special meaning or usage in said trade.

1.4. References to Contract or Contract Documents. Where reference is made in this Contract to a term of this Contract or in the other Contract Documents, the reference refers to that term as amended or supplemented by any other terms as set forth in the Contract Documents.

ARTICLE II **SCOPE OF WORK**

2.1. Scope of Work. Contractor shall execute all of the Work required by the Contract Documents and reasonably inferable by Contractor as necessary to produce the results intended by the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of any other Contractor.

2.2. Date of Commencement. The Date of Commencement shall be [DATE], as specified in the Notice To Proceed issued by SWACO, attached hereto as **Exhibit C**. All Contract Times not otherwise specifically set forth in the Contract Documents shall run from the Date of Commencement. Contractor shall begin the Work of the Project upon receipt of the Notice To Proceed issued by SWACO.

2.3. Term. The Work to be performed under this Contract shall be completed within the established Contract Times. The Date of Final Completion shall not be later than [DATE].

2.4. Liquidated Damages. Upon Contractor's failure to achieve Contract Completion, SWACO shall be entitled to retain or recover from Contractor, as Liquidated Damages, not as a penalty, the sum of three thousand dollars (\$3,000.00) for each and every calendar day subsequent to the Date of Final Completion until Contract Completion has been achieved by Contractor, unless an extension of time is granted in accordance with this Contract and the other Contract Documents.

2.4.1. The amount of Liquidated Damages is agreed upon by and between Contractor and SWACO because of the impracticality and extreme difficulty of ascertaining the actual amount of damages that SWACO would sustain as a result of Contractor failing to complete the Work in a timely manner.

2.4.2. SWACO's right to recover Liquidated Damages shall not substitute for any right of recovery for additional costs incurred should Contractor fail to complete the Work.

2.4.3. SWACO shall have the right to deduct Liquidated Damages owed by Contractor from any payments or other monetary amounts that SWACO may owe to Contractor for whatever reason.

2.5. Applicability of Law. Contractor shall perform the Work in accordance with pertinent provisions of federal, State (including, without limitation, the Ohio Revised Code and the Ohio Administrative Code), and/or local statutes, ordinances, rules and regulations.

2.5.1. The laws of the State of Ohio, without regard to its own “choice of law” provisions, shall govern to the exclusion of the laws of any other jurisdiction in the interpretation and application of the terms, conditions, and/or provisions of the Contract Documents, as well as any other claim, suit, or action between the parties whether such other claim, suit, or action is based upon tort or otherwise. Any action or proceeding pertaining to the Contract Documents and/or other any other claim, suit, or action between the parties shall be heard in the Franklin County Ohio Court of Common Pleas.

2.6. Non-Discrimination. During the performance of this Contract, Contractor agrees that in the hiring of employees for the performance of the Work, including without limitation Work to be performed by a Subcontractor, neither Contractor nor any Subcontractor, and no person acting on behalf of Contractor or any Subcontractor, shall, by reason of race, religion, creed, color, national origin, age, sex, disability, or military status, discriminate against any citizen in the employment of labor or workers who are qualified and available to perform the Work to which the employment relates. Contractor further agrees that no Subcontractor, and no person acting on behalf of Contractor or a Subcontractor, shall, in any manner, discriminate against or intimidate any employee hired for the performance of work on account of race, religion, creed, color, national origin, age, sex, disability, or military status.

2.7. Subcontractors. Contractor may perform the Work through one or more Subcontractors employed by Contractor provided, however, that Contractor shall remain responsible to SWACO for all duties and obligations of Contractor under this Contract. Unless waived or otherwise modified in writing by SWACO upon written request of Contractor, no Subcontractor shall be retained upon terms inconsistent with this Contract. The identity of any Subcontractor and the extent of such Subcontractor's participation in performing Contractor's services as set forth in the Contract Documents shall not be altered except as set forth in the General Conditions.

2.8. Project Engineer. SWACO, or its authorized representative or designee, shall be the Engineer for the Project (“Project Engineer”) as set forth herein and in the Contract Documents. All references in the Contract Documents to the Engineer or Project Engineer shall mean the person(s) and/or firms listed in this paragraph.

2.9. Construction Management Team. The “Construction Management Team (“CMT”),” or any other person or persons designated to act on behalf of the Construction Management Team, shall be designated by SWACO.

ARTICLE III **COMPENSATION**

3.1. Compensation. SWACO shall pay Contractor in current funds for the performance of the Work as set forth in the Contract and other Contract Documents in an amount not to exceed the Contract price of [AMOUNT] (AMOUNT), based upon the Bid Form dated [DATE], attached hereto as Exhibit B, and submitted by Contractor subject to the terms as set forth in the Contract Documents.

3.2. Contract Price Increases. Unless otherwise set forth in the Contract Documents, any increase in the Contract Price shall be pursuant to the terms set forth in Article IX of the General Conditions.

3.3. Progress Payments. Unless otherwise set forth in the Contract Documents, progress payments shall be made to Contractor pursuant to the terms set forth in Article XII of the General Conditions.

3.4. Final Payment. Unless otherwise set forth in the Contract Documents, Final Payment shall be made to Contractor pursuant to paragraph 12.13 of the General Conditions, and when all other requirements, conditions, and terms as set forth in the General Conditions and the other Contract Documents have been met by Contractor.

3.5. Contract Funding. Contractor's compensation pursuant to the terms of this Contract is subject to the annual approval of funding for this Contract by SWACO's Board of Trustees. If, for any reason, funds are no longer available to SWACO to compensate Contractor for its Work under this Contract, this Contract shall immediately terminate with no further obligation of SWACO to compensate Contractor. Notwithstanding any other terms of this Contract, the maximum financial obligation of SWACO shall not exceed [AMOUNT] (AMOUNT) unless and until such additional funds are approved by the SWACO Board of Trustees, and an appropriate Change Order has been entered into by Contractor and SWACO.

ARTICLE IV **TERMINATION**

4.1. Termination. This Contract may not be terminated except as set forth in the General Conditions.

ARTICLE V **MISCELLANEOUS TERMS**

5.1. Property of SWACO. Plans, Specifications, Drawings, or other documents prepared by SWACO, or with the cooperation of Contractor or any Subcontractor pursuant to this Contract, are the property of SWACO whether or not the Project for which they are prepared is commenced or completed. All such Plans, Specifications, Drawings, or other documents which have been prepared in the course of the Work done under this Contract that are available in digital format shall be submitted to SWACO upon Project completion, Contract termination, or as requested by SWACO. Contractor or Subcontractor, as applicable, may retain copies, including reproducible copies of such Plans, Specifications, Drawings, or other documents for information and reference. Such Plans, Specifications, Drawings, or other documents may be used by SWACO and/or its authorized representatives or designees for reference in any completion, correction, remodeling, renovation, reconstruction, alteration, modification of, or addition to the Project, without compensation to Contractor or Subcontractors.

5.2. Records. During the term of this Contract and for a period of [NUMBER] years after SWACO makes final payment to Contractor and closes out all pending matters related to the Contract Documents, Contractor shall keep all books, documents, papers, and records that it generates during the term of this Contract which are directly pertinent to this Contract and any other Contract Documents. During such period of time, Contractor shall grant SWACO, the State of Ohio Department of Development, the United States Department of Energy, the Comptroller General of the United States, or any of their duly authorized representatives or successors, access to any of its books, documents, papers, and records which are directly pertinent to this Contract and any other Contract Documents for the purposes of making audits, examinations, excerpts, and transcription.

5.3. Successors and Assigns. SWACO and Contractor each bind themselves, their successors, assigns, and legal representatives to the other party to this Contract and to the successors, assigns, and legal representatives of the other party with respect to all terms of this Contract. Contractor shall not assign, or transfer any right, title, or interest in this Contract without the prior written consent of SWACO, which SWACO may withhold for any reason.

5.4. Entire Contract. This Contract and Contract Documents represent the entire and integrated Contract between SWACO and Contractor and supersede all prior negotiations, representations, or contracts, either written or oral. This Contract and the Contract Documents embody the entire understanding of the parties and form the basis of the Contract between SWACO and Contractor. The Contract Documents shall be considered incorporated herein by reference into this Contract as if fully rewritten herein.

5.5. Modifications. Pursuant to the General Conditions, this Contract may only be modified through a Change Order signed by Contractor and, as appropriate, SWACO's Board of Trustees or SWACO's Executive Director. Any other change to the terms and conditions of this Contract will not be legally binding, even if signed by another employee of SWACO, pursuant to SWACO's procurement policy. Additionally, any written modification to the scope of services must also include the impact to the compensation as provided for in Article III.

5.6. Multiple Counterparts. This Contract may be executed in multiple counterparts, each of which shall be regarded as an original and each of which shall constitute but one and the same instrument.

5.7. Captions. The captions or headings in this Contract are for convenience only and in no way define, limit, or describe the scope or intent of any terms or sections hereof.

5.8. Precedence. If there are any inconsistencies between terms as set forth in the Contract Documents, SWACO shall be immediately notified by Contractor in accordance with the terms as provided in Article II. SWACO, in consultation with Engineer and/or the Project Representative, and consistent with the provisions of Article II, shall then advise Contractor as to the proper interpretation of the terms that are allegedly in conflict.

5.9. Notices. All notices, certificates, requests, or other communications hereunder shall be in writing and shall be deemed to be given if delivered in person to the individual or to a member of the company or organization for whom the notice is intended, or if delivered at or mailed by registered or certified mail, postage prepaid, to the appropriate addresses and contact persons set forth in this paragraph.

If to SWACO and/or Project Engineer:

Attn: [PROJECT MANAGER]
Solid Waste Authority of Central Ohio
4239 London Groveport Road
Grove City, Ohio 43123

If to Contractor:

[CONTRACTOR]

5.10. Emergencies. In the event of an emergency involving the Project, including without limitation, a fatality, serious injury, fire, collapse, flood, utility or power loss to occupied facilities, explosion, or environmental damage, Contractor shall immediately notify SWACO by direct telephone contact or in person, whichever method is more expedient.

5.11. Change of Address. SWACO or Contractor may, by notice given hereunder, designate different addresses, telephone numbers, or facsimile numbers to which subsequent notices, certificates, requests, or communications shall be sent.

5.12. Severability. If any term, covenant, obligation, or condition of this Contract or the Contract Documents is determined by a court of competent jurisdiction to be invalid or unenforceable, such determination shall not affect any other term, covenant, obligation, or condition, each of which shall be construed and enforced as if such invalid or unenforceable term, covenant, obligation, or condition was not contained herein. Such invalidity or unenforceability shall not affect any valid and enforceable application thereof, and each such term, covenant, obligation, or condition, shall be deemed to be effective, operative, made, entered into, or taken in the manner and to the full extent permitted by law.

5.13. Independent Contractor. SWACO and Contractor agree that nothing contained in this Contract is intended, or shall be construed to create or establish the relationship of a partnership, joint venture, or other business organization between the Parties hereto. This Contract shall not be construed so as to create an agency, representative, or employment relationship between Contractor or its employees and SWACO. Neither Contractor nor its employees shall be considered an employee of SWACO, and any and all claims that may or might arise under the Workers' Compensation Act of the State of Ohio or otherwise on behalf of Contractor or its employees while engaged in performing the Work shall in no way be the responsibility of SWACO. Neither Contractor nor its employees shall acquire or be entitled to any compensation, rights, benefits, and participation of any kind as offered by SWACO including, without limitation, tenure rights, participation in the Ohio Public Employees Retirement System, medical and hospital care, sick and vacation leave, workers' compensation, unemployment compensation, disability, and severance pay.

5.14. Contractor Compliance with Law and Ethics Provisions. By executing this Contract, Contractor acknowledges that it is in compliance, and that it will remain in compliance during the term of this Contract, with all federal, State, municipal and/or other local laws, ordinances, resolutions, rules and regulations that govern the performance of this Contract and the Contract Documents, including, without limitation:

Ohio Revised Code sections 102.04, 3517.1, and 3517.13 divisions (I) and (J); and

Executive Order 11246 of September 24, 1965, entitled "Equal Employment Opportunity" as amended by Executive Order 11375 of October 13, 1967 and as supplemented from time to time by regulations issued by the Department of Labor (41 C.F.R. Ch. 60); and

the Copeland Anti-Kickback Act (18 U.S.C. 874), as supplemented from time to time by regulations issued by the U. S. Department of Labor (29 C.F.R. Part 3); and

the Davis-Bacon Act (40 U.S.C. 276a to 276a-7) as supplemented from time to time by regulations issued by the U. S. Department of Labor (29 C.F.R. Part 5); and

the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-330, Sections 103 and 107) as supplemented from time to time by regulations issued by the U. S. Department of Labor (29 C.F.R. Part 5); and

pertinent U.S. Department of Energy requirements and regulations regarding its rights to any patent, copyright and/or data that arise and/or is developed during the prosecution of the Work described in the Contract Documents; and

all applicable standards, orders, or requirements issued under the Clean Air Act (42 U.S.C. 1857(h) Section 306); the Clean Water Act (33 U.S.C. 1368, Section 508); and regulations issued by the U.S. Environmental Protection Agency from time to time (40 C.F.R. part 15); and

all mandatory standards and policies relating to energy efficiency which are contained in the State of Ohio energy conservation plan issued in accordance with the Energy Policy and Conservation Act (Pub. L. 94-163, 89 Stat. 871).

5.15. Signatures. The parties agree that facsimile, electronic or scanned signatures shall be acceptable and shall have the same effect as original signatures.

5.16. Effective Date. This Contract shall become effective on the date as set forth herein.

5.17. Additional Terms and Conditions. SWACO and Contractor have included additional terms and conditions specific to this Contract, they shall be set forth and described in Exhibit D and incorporated herein by reference as if fully rewritten. In the event of a conflict between the exhibits and the standard terms and conditions as provided in these Sections 1.1. through 5.17., the standard terms and conditions as provided in Sections 1.1. through 5.17. shall prevail.

Signature Page Follows

IN WITNESS WHEREOF, the parties hereto have caused this Contract to be executed by their duly authorized representatives on the dates set forth below:

SWACO:
Solid Waste Authority of Central Ohio

By: _____
Joseph A. Lombardi, Executive Director

Date: _____

CONTRACTOR:
[CONTRACTOR]

By: _____
*Authorized Signature

Date: _____

*By signing above, you represent and warrant that you have the full power and authority to execute this Agreement on behalf of the Contractor, and bind the Contractor to this Agreement, as well as the terms, conditions and obligations set forth herein.

Approved as to Form:

Rebecca L. Egelhoff, Director of Legal Affairs
Solid Waste Authority of Central Ohio

Date: _____

Exhibit C

Sample Contract and Contract Forms (*Continued*)

Contract Forms

- A. Supplementary Conditions
- B. Notice of Award
- C. Notice to Proceed
- D. Notice of Commencement of Public Improvement
- E. Field Work Order
- F. Change Order
- G. Certificate of Substantial Completion
- H. Partial Release and Waiver of Lien
- I. Final Release and Waiver of Lien
- J. Release of Lien



**SUPPLEMENTARY CONDITIONS
FOR SWACO FACILITIES CONSTRUCTION**
(Paragraphs keyed to the SWACO's General Conditions)

**[INSERT PROJECT NAME]
[DATE OF PROJECT]**

INSERT SUPPLEMENTARY CONDITIONS AS NECESSARY.

SAMPLE

NOTICE OF AWARD

[DATE]

[CONTRACTOR NAME]
[CONTRACTOR ADDRESS]
[CITY, STATE ZIP]

RE: [PROJECT NAME]

Dear Mr./Ms. [NAME]:

You are hereby notified that the Solid Waste Authority of Central Ohio (herein called "SWACO"), has reviewed all Bids submitted for [NAME OF PROJECT].

In accordance with the Bid Documents prepared for [INSERT PROJECT NAME], your Bid in the amount of \$[INSERT DOLLAR AMOUNT] has been accepted. SWACO intends to execute the Contract for this Project, provided, however, that you comply with the obligations of the Successful Bidder set forth in the SWACO General Conditions. Acceptance by SWACO is conditioned upon your compliance with those obligations and SWACO reserves the right to refrain from entering into or to rescind the contract if you do not fulfill those obligations within the respective times specified.

All required Bonds and Certificates of Insurance, in accordance with Article III of the SWACO General Conditions, shall be submitted to SWACO within fifteen (15) calendar days of the date of this Notice of Award for review and approval.

Subsequent to execution of the contract by SWACO, one (1) copy of the fully executed Agreement will be returned to you.

SOLID WASTE AUTHORITY OF CENTRAL OHIO

By: _____
[PRINTED NAME]
[TITLE]

NOTICE TO PROCEED

[DATE]

[CONTRACTOR]

[ADDRESS OF CONTRACTOR]

RE: [PROJECT NAME]

Dear Mr./Ms. [NAME]

You are hereby notified to commence Work in accordance with the Contract dated _____, 20____, on or before _____, 20____. Contractor shall complete the work in accordance with the dates for each milestone in the Contract, repeated below for reference only. Liquidated damages in the amount contained in the Contract for each calendar day the work remains incomplete after its associated milestone date will be imposed unless the Contract Times are otherwise adjusted for due cause by Change Order to the Contract.

MILESTONE	MILESTONE DATE
Substantial Completion of Work	[DATE]
Work Complete and Ready for Final Payment	[DATE]

SOLID WASTE AUTHORITY OF CENTRAL OHIO

By: [PROJECT MANAGER NAME AND TITLE]

NOTICE TO PROCEED

Page Two

ACCEPTANCE OF NOTICE

Receipt of the above NOTICE TO PROCEED is hereby acknowledged by [NAME OF CONTRACTOR] this _____ day of _____, 20____.

By: _____
(Signature of Officer)

(Print Name and Title of Officer)

Notice of Commencement of Public Improvement

Solid Waste Authority of Central Ohio
4239 London Groveport Road, Grove City, Ohio 43123
Phone: (614) 871-5100 • Fax: (614) 871-5103

Notice is hereby given in accordance with Section 1311.252 Ohio Revised Code of the commencement of the Public Improvement identified as:

Project Name _____	Public Owner Solid Waste Authority of Central Ohio
_____	4239 London Groveport Road
Project Location _____	Grove City, Ohio 43123
County _____	_____

Public Authority

The Public Authority responsible for the public improvement is:

Solid Waste Authority of Central Ohio
4239 London Groveport Road
Grove City, Ohio 43123

Designated Representative

The representative to whom service of an affidavit may be made pursuant to Section 1311.26 Ohio Revised Code is:

Mr. Joseph A. Lombardi, Executive Director
Solid Waste Authority Of Central Ohio
4239 London Groveport Road
Grove City, Ohio 43123

Affidavit

I certify or affirm that to the best of my knowledge, the information provided in this document is true and correct and that I am fully authorized to provide this Notice.

Affiant:

Solid Waste Authority of Central Ohio

Joseph A. Lombardi, Executive Director

Notary

The Affiant acknowledged and signed this instrument before me, a Notary Public in and for the County of _____, Ohio.

[Seal] Sworn and subscribed before me this _____ day of _____, 20____.

Notary Public
My commission expires _____

Notice of Commencement of Public Improvement *(Continued)*

Solid Waste Authority of Central Ohio

4239 London-Groveport Road, Grove City, Ohio 43123

Phone: (614) 871-5100 • Fax: (614) 871-5103

Project Information

Project Name _____

Project Location _____

County _____

Contractor (attached additional pages as necessary)	Surety
Name _____	Name _____
Address _____	Address _____
City, State, Zip _____	City, State, Zip _____
Trade _____	
Contract _____	
Execution Date _____	
Name _____	Name _____
Address _____	Address _____
City, State, Zip _____	City, State, Zip _____
Trade _____	
Contract _____	
Execution Date _____	
Name _____	Name _____
Address _____	Address _____
City, State, Zip _____	City, State, Zip _____
Trade _____	
Contract _____	
Execution Date _____	
Name _____	Name _____
Address _____	Address _____
City, State, Zip _____	City, State, Zip _____
Trade _____	
Contract _____	
Execution Date _____	
Name _____	Name _____
Address _____	Address _____
City, State, Zip _____	City, State, Zip _____
Trade _____	
Contract _____	
Execution Date _____	

FIELD WORK ORDER

[*Name of Project*]

FIELD WORK ORDER NO. _____

TO: _____
(Contractor's Name)

(Contractor's Address)

(Contractor's Address)

ATTN: _____
(Contractor's Contact)

TITLE: _____

DESCRIPTION:

REASON:

Issued By: _____
(Name and Title)

Issued Date: _____

CONSTRUCTION CHANGE ORDER

NO. _____

CONTRACTOR: _____ PROJECT NAME _____

ADDRESS: _____

_____ CONTRACT _____

DATE: _____

You are hereby authorized and directed to make the changes to your contract with the Solid Waste Authority of Central Ohio covering the above project, as described below:

Bid Item No.	Bid Item	Unit	Original			Revised		
			Quantities	Unit Price	Bid Price	Quantities	Unit Price	Bid Price
	TOTAL				0.00			0.00

Description of Changes

Description of Changes

Justification for Change

Justification for Change

Additional Contract Days: (If none, state "NONE") NONE



For the labor, material and any other necessary costs to make the change or for omitting labor and material and any other costs, you will be allowed the additions or deductions to the amount of your contract as follows:

CONTRACT AMOUNT TO DATE	\$ _____	
ADDITION TO CONTRACT		\$ _____
DEDUCTION FROM CONTRACT	\$ _____	
NET CONTRACT AMOUNT		\$ _____
NEW CONTRACT AMOUNT		\$ _____

It is hereby understood that the provisions of the Contract will not be otherwise changed or affected by this order.

RECOMMENDED BY:

Owner:
Solid Waste Authority of Central Ohio:

By: Project Manager (Date)

REVIEWED BY:

Owner:
Solid Waste Authority of Central Ohio:

By: Department Manager (Date)

ACKNOWLEDGED BY:

Owner:
Solid Waste Authority of Central Ohio

By: Finance Manager (Date)

APPROVED BY:

Owner:
Solid Waste Authority of Central Ohio

By: Scott Perry, Assist. Executive Director (Date)

ACCEPTED BY:

Contractor:
[Contractor Name]

By: [Name, Title] (Date)



CERTIFICATE OF SUBSTANTIAL COMPLETION

PROJECT: _____ [Project Name] _____

DATE OF ISSUANCE: _____

OWNER: _____ Solid Waste Authority of Central Ohio (SWACO) _____

PROJECT NO.: _____

CONTRACTOR: _____

ENGINEER: _____

This Certificate of Substantial Completion applies to all Work under the Contract Documents or to the following specified parts thereof.

TO: _____ Solid Waste Authority of Central Ohio _____
(OWNER)

And TO: _____ _____
(CONTRACTOR)

The Work to which this Certificate applies has been inspected by authorized representatives of SWACO, CONTRACTOR and ENGINEER, and that Work is hereby declared to be substantially complete in accordance with the Contract Documents on **INSERT DATE OF SUBSTANTIAL COMPLETION**.

A tentative list of items to be completed or corrected is attached hereto. This list may not be all-inclusive, and the failure to include an item in it does not alter the responsibility of CONTRACTOR to complete all the Work in accordance with the Contract Documents. The items in the tentative list shall be completed or corrected by CONTRACTOR within _____ days of the above date of Substantial Completion.

From the date of Substantial Completion, the responsibilities between OWNER and CONTRACTOR for security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees shall be as follows:

RESPONSIBILITIES

OWNER: _____

CONTRACTOR: _____

The following documents are attached to and made a part of this Certificate:

[For items to be attached, see definition of Substantial Completion as supplemented and other specifically noted conditions precedent to achieving Substantial Completion as required by Contract Documents.]

This certificate does not constitute an acceptance of Work not in accordance with the Contract Documents nor is it a release of Contractor's obligation to complete the Work in accordance with the Contract Documents.

Executed by ENGINEER on _____, 20____

ENGINEER

By: _____
Authorized Signature

CONTRACTOR accepts this Certificate of Substantial Completion _____, 20____

CONTRACTOR

By: _____
Authorized Signature

OWNER accepts this Certificate of Substantial Completion on _____, 20____

OWNER

By: _____
Authorized Signature

END OF CERTIFICATE OF SUBSTANTIAL COMPLETION

PARTIAL RELEASE AND WAIVER OF LIEN

STATE OF _____)
) SS:
COUNTY OF _____)

The undersigned, _____ (hereinafter referred to as "Contractor") hereby represents that on _____ it was awarded a Contract by the Solid Waste Authority of Central Ohio, 4239 London Groveport Road, Grove City, Ohio 43123 (hereinafter referred to as "Owner"), to construct the _____ in accordance with the terms and conditions of the Contract dated _____ 20____, and the undersigned further represents that all progress payments heretofore received from the Owner on account of the Work have been applied by the Contractor to discharge in full all of the Contractor's obligations incurred in connection with the Work covered by all prior Estimates.

This affidavit is freely and voluntarily given with full knowledge of the facts, on this _____ day of _____, 20____.

[NAME OF CONTRACTOR]

(Contractor)

By: _____

Title: _____

Subscribed and sworn to before me this _____ day of _____, 20____.

Notary Public

My commission expires _____



FINAL RELEASE AND WAIVER OF LIEN

STATE OF _____)
) SS:
COUNTY OF _____)

The undersigned, _____ hereby represents that on _____, he/it was awarded a contract by Solid Waste Authority of Central Ohio, 4329 London Groveport Road, Grove City, Ohio 43123 hereinafter called the Owner, to construct the _____ [PROJECT NAME] _____ in accordance with the terms and conditions of the Agreement dated _____, 20____; and the said contract has now been completed.

The undersigned hereby warrants and certifies that all of his (its) indebtedness arising by reason of the said contract has been fully paid or satisfactorily secured; and that all claims from subcontractors and others for labor and material used in accomplishing the said project, as well as all other claims arising from the performance of the said contract, have been fully paid or satisfactorily settled. The undersigned further agrees that, if any such claim should hereafter arise, he (it) shall assume responsibility for the same immediately upon request to do so by the Owner.

The undersigned, for a valuable consideration, the receipt of which is hereby acknowledged, does further hereby waive, release and relinquish any and all claims or right of lien which the undersigned now has or may hereafter acquire upon the subject premises for labor and material used in accomplishing said project owned by the Owner.

This affidavit is freely and voluntarily given with full knowledge of the facts, on this _____ day of _____, 20____.

(Contractor)

By _____

(Title)

Subscribed and sworn to before me this _____ day of _____, 20____.

Notary Public

My commission expires _____



RELEASE OF LIEN AFFIDAVIT

(To be completed by all Contractors, Subcontractors and Materialmen Pursuant to ORC Section 1311.26 to 1311.32)

STATE OF _____)
) SS:
COUNTY OF _____)

TO WHOM IT MAY CONCERN:

WHEREAS, the undersigned _____ has been employed has
(Contractor, Subcontractor or Materialmen)
been employed by _____ to furnish labor
(Prime Contractor / Owner)
and/or materials for _____ for the Project known
(Nature of the Work)
as [PROJECT NAME] at _____ in Franklin County, Ohio.
The last of said labor and/or materials was provided to the above described project on the _____ day of
_____, 20____.

NOW, THEREFORE, KNOW YE, that the undersigned for and in consideration of the sum of _
[INSERT DOLLAR AMOUNT] dollars and other good
and valuable considerations, the receipt of which is hereby acknowledged, do hereby waive and release
any and all funds at any time heretofore or hereafter designated for use in connection with the above
described project, under the statutes of the State of Ohio relating to mechanics' liens, on funds for public
works, on account of labor or materials, or both, furnished by the undersigned to or on account of the said
firm or individual named for said building or premises.

Witness: _____

Witness: _____ By: _____

Title: _____

Subscribed and sworn to before me this _____ day of _____, 20____.

Notary Public
My commission expires _____

Exhibit D

006. SWACO General Conditions for Construction

Any exceptions to the SWACO General Conditions of the Contract for Construction must be noted in the ***Exceptions to RFB*** form included with the Required Forms in Exhibit B.



Solid Waste Authority of Central Ohio

General Conditions of the Contract for Construction

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ARTICLE I DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents, the following terms have the following meanings indicated which are applicable to both the singular and plural thereof:

1.1 Addenda – Written or graphic instruments issued prior to the opening of Bids, which clarify, correct, or change the Bidding Requirements or the Contract Documents.

1.2 Administrative Costs – Includes compensation paid to Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, purchasing, and contracting agents, expeditors, timekeepers, clerks, and other personnel employed by Contractor, whether at the Project or in Contractor's principal or branch office, and other expenses for general administration of the Work.

1.3 Agreement – The written contract between SWACO and Contractor covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

1.4 Alternate – A proposed change in the Work described in the Contract Documents providing alternative materials, products or systems, or to add or delete portions of the Work.

1.5. Application for Payment – The form accepted by Engineer which is to be used by Contractor in progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

1.6 Asbestos – Any material that contains more than one percent (1%) asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

1.7 As-Built Drawings – Drawings or computer files revised by the Contractor to show changes made during the construction process.

1.8 Bid – The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

1.9 Bidding Documents – The advertisement or invitation to Bid, instructions to bidders, the Bid form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

1.10 Bidding Requirements – The advertisement or invitation to Bid, instructions to bidders, and the Bid form.

1.11 Board – The Board shall be defined as the Solid Waste Authority of Central Ohio Board of Trustees.

1.12 Bonds – Performance and Payment bonds and other instruments of security.

1.13 Change Order – A document recommended by Engineer, which is signed by Contractor and SWACO and authorizes an addition, deletion, or revision in the Work, or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement. No Change Order, or part thereof, that increases the Contract Price or provides for the expenditure of money for Work or other items or services not set-forth in the Contract Documents shall be effective unless such Change Order has been authorized by SWACO's Board of Trustees pursuant to SWACO's By-Laws and Procurement Policy. SWACO shall have no liability to pay Contractor for Work or other items or services performed or provided as the result of a Change Order which has not been authorized by SWACO's Board of Trustees pursuant to SWACO's By-Laws and Procurement Policy.

1.14 Claim Affidavit – A claim on the funds that are due to a Contractor, created by statute in favor of a person supplying labor, materials or services for the value of labor, materials or services supplied by the claimant.

1.15 Construction Manager – The individual and/or firm indicated as such in the Contract. The Construction Manager is a member of the CMT, whose specific division of duties shall be defined by SWACO.

1.16 Construction Schedule – The schedule for the construction of the Project showing the time for completing the Work, the planned sequence for performing the Work, Milestones, the Contractor's resource loading curve, and the interrelationship between the activities of the Contractors and SWACO.

1.17 Contract Completion – The date upon which all deficiencies noted in the Punch List have been corrected, the Contractor's Work is 100 percent complete, and the Contractor has complied with all conditions precedent to final payment and release of retainage.

1.18 Contract Documents – The Agreement, Addenda (which pertain to the Contract Documents), Contractor's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications, and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders, and Engineer's written interpretations and clarifications issued pursuant to the provisions herein on or after the Effective Date of the Agreement. Shop Drawing submittals approved pursuant to the provisions herein and the reports and drawings as referred to in paragraph 2.3.5 are not Contract Documents.

1.19 Contract Price – The moneys payable by SWACO to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement, subject to the provisions governing Unit Price Work, if applicable.

1.20 Contract Times – The number of days or the dates stated in the Agreement to (i) achieve Substantial Completion, and (ii) complete the Work so that it is ready for final payment as evidenced by the Engineer's written recommendation of final payment.

1.21 Contractor – The person, firm, or corporation with whom SWACO has entered into the Agreement.

1.22 Day – Calendar Day, unless otherwise expressly specified to mean a working Day.

1.23 Defective – An adjective which when modifying "Work" refers to Work that is unsatisfactory, faulty, or deficient, in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test, or approval referred to in the Contract Documents, or has been damaged prior to Engineer's recommendation of final payment, unless responsibility for the protection thereof has been assumed by SWACO at Substantial Completion in accordance with paragraph 9.3 or as otherwise stated herein.

1.24 Drawings – The drawings which show the scope, extent, and character of the Work to be furnished and performed by Contractor and which have been prepared or approved by Engineer and are referred to in the Contract Documents. Shop Drawings are not Drawings so defined.

1.25 Effective Date of the Agreement – The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the of the two (2) parties to sign and deliver.

1.26 Engineer – The person, firm, or corporation named as such in the Agreement.

1.27 Engineer's Consultant – A person, firm, or corporation having a contract with Engineer to furnish services as Engineer's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions.

- 1.28 Field Order** – A written order issued by Engineer which orders minor changes in the Work in accordance with paragraph 7.5 but which does not involve a change in the Contract Price or Contract Times.
- 1.29 Final Acceptance** – SWACO’s acceptance of the project from the contractor upon certification by the CMT of Contract Completion.
- 1.30 Final Inspection** – Final review of the Work of the Contractor by the CMT to determine whether issuance of the certificate of Contract Completion is appropriate.
- 1.31 Guarantee** – Legally enforceable assurance, for a period of one year from date of Contract Completion, of quality or performance of the Contractor’s workmanship.
- 1.32 Laws and/or Regulations** – Any and all applicable laws, rules, regulations, ordinances, codes, and orders of any and all governmental bodies, agencies, authorities, and courts having jurisdiction.
- 1.33 Liquidated Damages** – The sum established in the Contract Documents as the predetermined measure of damages to be paid to SWACO due to the Contractor’s failure to complete the Work, or portions thereof, within a stipulated time.
- 1.34 Liens** – Liens, charges, security interests, or encumbrances upon real or personal property.
- 1.35 Material Supplier** – A person or entity who furnishes materials, supplies or equipment incorporated into the Work of the Project.
- 1.36 Milestone** – A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.
- 1.37 Notice of Commencement** – The notice prepared by SWACO identifying the Project, the Contractors, the Surety for each Contractor and the name of SWACO’s designated representative upon whom a Claim Affidavit may be served.
- 1.38 Notice to Proceed** – A notice provided by SWACO to the Contractor authorizing the Contractor to proceed with the Work and establishing the date for commencement of the Work.
- 1.39 Owner** – The Solid Waste Authority of Central Ohio, and/or including its Board of Trustees, Executive Director, and/or employees. The term “Owner” is interchangeable with the term “SWACO”.
- 1.40 Partial Occupancy** – The stage in the progress of the Work when the Project, or a designated portion thereof, is sufficiently complete in accordance with the Contract Documents so that SWACO can occupy or utilize the Project, or designated portion thereof, for its intended use prior to Substantial Completion of all the Work.
- 1.41 Project** – The public improvement to be constructed, of which the Work performed under the Contract Documents may be the whole or a part as indicated in the Contract Documents.
- 1.42 Project Representative** – The designated representative of SWACO who is assigned to the Project to consult with the Contractor, CMT, and others involved in the Work, and authorized to perform specific responsibilities on behalf of SWACO.
- 1.43 Project Engineer** – The individual and/or firm indicated as such in the Contract. The term Engineer shall also be used in the Contract Documents to refer to the Project Engineer.
- 1.44 Punch List** – A list of items of Work to be completed or corrected by the Contractor as a condition precedent to Contract Completion and final payment.
- 1.45 Record Drawings** – Drawings or computer files revised by an Architect or Engineer to show the changes made during the construction process, based on the As-Built Drawings furnished by the Contractor to SWACO.
- 1.46 Rendered Harmless** – The level of exposure is less than any applicable exposure standards set forth in OSHA or other applicable regulations.

1.47 Samples – Physical examples of materials, equipment, or workmanship furnished by Contractor that are representative of some portion of the Work, and establish the standards by which the Work will be judged.

1.48 Schedule of Values – A statement furnished by the Contractor to SWACO and the Project Engineer reflecting the portions of the Contract Price allocated to the various portions of the Work and used as the basis for reviewing the Contractor's Applications for Payment.

1.49 Shop Drawings – Drawings, diagrams, illustrations, schedules, performance charts, brochures, catalog data, and other data or information specially prepared or provided by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

1.50 Site – Lands or areas indicated in the Contract Documents as being furnished by SWACO upon which the work is to be performed, including rights-of-way and easements for access thereto, and such other lands furnished by SWACO which are designated for the use of Contractor.

1.51 Specifications – Those portions of the Contract Documents consisting of the written descriptions and/or technical standards for materials, equipment, construction systems, and workmanship as applied to the Work and certain administrative details applicable thereto.

1.52 Standard – The items named in the Specifications or Addendum to denote kind, quality, or performance requirements for each significant portion of the Work. All Bids or Proposals shall be based on the trade names, catalog numbers, manufacturers, materials or equipment named in the Specifications or Addendum.

1.53 Subcontractor – An individual or firm having a direct contract with Contractor or with any other Subcontractor for the performance of a part of the Work at the Site.

1.54 Substantial Completion – The Work, or a specified part thereof, that has progressed to the point where, in the opinion of the Engineer as evidenced by Engineer's definitive Certificate of Substantial Completion, is sufficiently complete, in accordance with the Contract Documents, so that the Work, or specified part, can be utilized for the purposes for which it is intended; or if no such Certificate is issued, when the Work is complete and ready for final payment as evidenced by Engineer's written recommendation of final payment in accordance with the terms herein. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

1.55 Substitution – A proposed equal to a Standard which must be submitted to SWACO in writing no later than ten (10) Days prior to the Bid opening and which, if approved, will be listed in an Addendum and distributed to all Bidders.

1.56 Supplementary Conditions (Division 1 of the Contract Documents) – Conditions which describe circumstances unique to a particular Project, including without limitation, provisions regarding the assignment of responsibility for refuse removal, and for safety and security precautions and programs regarding temporary Project facilities and utilities, weather and fire protection, scaffolding and equipment, materials and services to be used commonly by Contractors and requiring Contractors to provide assistance in the utilization of any applicable equipment system, preparation of operation and maintenance manuals, necessary training of SWACO personnel for operation and maintenance of the Project.

1.57 Supplier – A manufacturer, fabricator, supplier, distributor, materialman, or vendor having a direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

1.58 Surety – A person or entity providing a Bid Guaranty or a Bond to a Bidder or a Contractor to indemnify SWACO against all direct and consequential damages suffered by failure of the Bidder to enter into the Contract or of the Contractor to perform the Contract and to pay all lawful claims of Subcontractors, Material Suppliers and laborers, as applicable.

1.59 SWACO – The Solid Waste Authority of Central Ohio, and/or including its Board of Trustees, Executive Director, and/or employees. The term "SWACO" is interchangeable with the term "Owner."

1.60 SWACO Caused Delay – A delay in the Work caused by, or resulting from, the actions of SWACO. Without limitation, a delay in the Work attributable to a Contractor of SWACO or resulting from any weather conditions is not a SWACO Caused Delay.

1.61 Underground Facilities – All underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gasses, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, storm water, other liquids or chemicals, or traffic or other control systems.

1.62 Unit Price – The amount stated in the Bid as the price per unit of measurement for materials or services described in the Contract Documents, which cost shall include overhead, profit and any other expense for the Work.

1.63 Warranty – Legally enforceable assurance, for the specified duration from acceptance by SWACO, of quality or performance of materials and equipment.

1.64 Work – The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor, furnishing and incorporating materials and equipment into the construction, performing or furnishing services, and/or furnishing documents, all as required by the Contract Documents.

1.65 Work Change Directive – A written directive to Contractor, issued on or after the Effective Date of the Agreement, signed by SWACO and recommended by Engineer, ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed. A Work Change Directive will not change the Contract Price or Contract Times, but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times as provided herein.

ARTICLE II GENERAL PROVISIONS

2.1 APPLICATION AND GOVERNING LAW

2.1.1 The Contractor shall be familiar with all provisions of these General Conditions.

2.1.2 There shall be no change in the General Conditions unless so provided in the Supplementary Conditions.

2.1.3 The parties to the Contract shall comply with all applicable federal, state and local codes, statutes, ordinances and regulations in the performance of the Work of the Project.

2.1.4 SWACO may maintain an action for violations of any law relating to the Project or for any injury to persons or property pertaining to the Work, or for any other cause which is necessary in the performance of SWACO's duties.

2.2 CONDITIONS OF CONTRACT

2.2.1 Nondiscrimination

2.2.1.1 During the performance of the Contract, the Contractor agrees that in the hiring of employees for the performance of the Work, including without limitation Work to be performed by a Subcontractor, no Contractor or Subcontractor, and no person acting on behalf of the Contractor or Subcontractor, shall, by reason of race, religion, creed, national origin, age, sex, disability, Vietnam era Veteran status, or color, discriminate against any citizen in the employment of labor or workers who are qualified and available to perform the Work to which the employment relates.

2.2.1.2 The Contractor further agrees that no Subcontractor, and no person acting on behalf of the Contractor or Subcontractor, shall, in any manner, discriminate against or intimidate any employee hired for the performance of Work on account of race, religion, creed, national origin, age, sex, disability, Vietnam-era Veteran status, or color.

2.2.2 Wages and Hours

2.2.2.1 The Contractor shall pay the prevailing wage rates of the Project locality, as determined by the Ohio Bureau of Employment Services, Wage and Hour Division, for all laborers and mechanics performing Work on the Project.

2.2.2.2 The Contractor shall comply with the provisions, duties, obligations, and is subject to the remedies and penalties of, Ohio Revised Code Chapter 4115, "Wages and Hours on Public Works."

2.2.2.3 SWACO shall, within seven (7) working Days after receipt of a notice of a change in the prevailing wage rates, notify the Contractor of the change. The Contractor shall make the necessary adjustment in the prevailing wage rate and pay any wage increase to its employees during the term of the Contract at no additional cost to SWACO.

2.2.3 Notice of Commencement

2.2.3.1 Pursuant to Ohio Revised Code Section 1311.252, SWACO shall prepare a Notice of Commencement in affidavit form identifying SWACO and setting forth its address; the name, address and Project number of the Project; the name and address of Contractor; the name and address of SWACO's Project manager upon whom a Claim Affidavit may be served; the date of execution of the Contract; and the name and address of the Surety for Contractor.

2.2.3.2 The Notice of Commencement shall be made available to the general public upon request.

2.2.4 Giving Notice

2.2.4.1 Whenever any provision of the Contract Documents requires the giving of any notice, such notice shall be deemed to have been validly given if delivered (a) in person to the individual or to a member of the company or organization for whom the notice is intended, or (b) sent by registered or certified mail, postage prepaid, to the last business address of such individual or company identified herein. The individuals and addresses to which notice should be delivered are those identified in Section 2.2.4.2, below.

2.2.4.2 Any notice to SWACO, the Project Engineer, the Construction Management Team (“CMT”) and/or other Contractors (if any) shall be delivered to the respective address and person designated by each, in the Contract Documents, to receive notice.

2.2.5 Calculation of Time

2.2.5.1 When any period of time is referred to in the Contract Documents by Days, such period of time shall be computed to exclude the first and include the last Day of such period. If the last Day of any such period falls on a Saturday, Sunday or a legal holiday, such Day will be omitted from the computation and such period shall be deemed to end on the next succeeding Day which is not a Saturday, Sunday or legal holiday.

2.2.6 Before Starting Construction

2.2.6.1 Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents, check and verify pertinent figures shown thereon, and all applicable field measurements. Contractor shall promptly report in writing to Engineer any conflict, error, ambiguity, or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Engineer before proceeding with any Work affected thereby.

2.2.6.2 Within ten (10) days after the Effective Date of the Agreement, unless otherwise specified, Contractor shall submit to Engineer for review:

2.2.6.2(a) a preliminary progress schedule indicating the times (number of days or dates) for starting and completing the various stages of the Work, including any Milestones as specified in the Contract Documents;

2.2.6.2(b) a preliminary schedule of Shop Drawing and Sample submittals which will list each required submittal and the times for submitting, reviewing, and processing such submittal;

2.2.6.2(c) a preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such process will include an appropriate amount of overhead and profit applicable to each item of Work.

2.2.6.3 Preconstruction Conference. Before any Work on site is started, Contractor shall deliver to Owner, with copies to each additional insured identified if applicable, the certificates of insurance (and any other evidence of insurance which may be reasonably requested) Contractor is required to purchase and maintain in accordance with paragraph 3.2.

2.2.6.4 Within twenty (20) days after the Contract time starts to run, but before any Work at the site is started, a conference attended by Contractor, Owner, Engineer, and others as appropriate, will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraphs 2.2.6.2(a) – (c), procedures for handling Shop Drawings and other Submittals, processing Applications for payment, and maintaining required records.

2.2.6.5 Initially Acceptable Schedules. Unless otherwise provided in the Contract Documents, at least ten (10) days before submission of the first Application for Payment a conference attended by Contractor, Owner, Engineer, and others as appropriate, will be held to review for acceptability to

Engineer as provided below the schedules submitted in accordance with paragraph 2.2.6.2. Contractor shall have an additional ten (10) days to make corrections and adjustments and to complete and resubmit the schedules. No progress payments shall be made to Contractor until the schedules are submitted and acceptable to Engineer. The progress schedule will be acceptable to Engineer as providing an orderly progression of the Work to completion within any specified Milestones and the Contract times, but such acceptance will neither impose on Engineer responsibility for the sequencing, scheduling, or progress of the Work nor interfere with or relieve Contractor from Contractor's full responsibility therefor. Contractor's schedule of Shop Drawings and Sample submissions will be acceptable to Engineer as providing a workable arrangement for reviewing and processing the required submittals. Contractor's schedule of values will be acceptable to Engineer as to form and substance.

2.3 CONTRACT DOCUMENTS

2.3.1 Intent

2.3.1.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor, and comprise the entire Agreement between Owner and Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all. The Contractor shall be held to provide all labor and materials necessary for the entire completion of the Work described in the Contract Documents and reasonably implied therefrom to produce the intended results.

2.3.1.2 The Drawings shall generally govern dimensions, details, and locations of the Work. The Specifications shall generally govern quality of materials and workmanship.

2.3.1.3 The organization of the Specifications in divisions, sections, and articles, and the arrangement of Drawings, shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

2.3.1.4 Unless otherwise specified in the Contract Documents, when words or phrases which have well-known technical or construction industry or trade meanings are used to describe Work, materials, or equipment, such words or phrases shall be interpreted in accordance with such recognized meanings. Clarifications and interpretations of the Contract Documents shall be issued by Engineer as provided herein.

2.3.1.5 References to standards, specifications, manuals, or codes of any technical society, organization, or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code, or Laws or Regulations in effect at the time of the Effective Date of the Agreement, except as may otherwise be specifically stated in the Contract Documents.

2.3.1.6 Anything shown on the Drawings and not mentioned in the Specifications or mentioned in the Specifications and not shown on the Drawings shall have the same effect as if shown or mentioned respectively in both.

2.3.2 Reporting and Resolving Inconsistencies

2.3.2.1 If during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such Law or Regulation applicable to the performance of the Work or of any such standard, specification, manual, or code, or of any instruction of any Supplier as referred to herein, Contractor shall immediately report said to Engineer in writing and request an interpretation or clarification. Contractor shall not proceed with the Work affected thereby until an amendment, supplement, or clarification to the Contract Documents has been issued. Engineer shall respond in writing within five (5) Days of receipt of the request to any and all requests for interpretation of the Contract Documents.

2.3.2.1(a) Any interpretation or clarification of the Contract Documents made by any person other than the Engineer, or in any manner other than writing, shall not be binding and the Contractor shall not rely upon any such interpretation or clarification.

2.3.2.2 Except as otherwise specified in the Contract Documents, or as may be provided by amendment or supplement thereto, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

2.3.2.2(a) the provisions of any such standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents); or

2.3.2.2(b) the provisions of any such Laws or Regulations applicable to the performance of the Work, unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation.

No provision of any such standard, specification, manual, code, or instruction shall be effective to change the duties and responsibilities of Owner, Contractor, Engineer, or any of their subcontractors, consultants, agents, or employees, from those set forth in the Contract Documents, nor shall it be effective to assign to Owner, Engineer, or any agent or consultant thereof, duty or authority to supervise or direct the furnishing or performance of the Work.

2.3.3 Construction Management Team (CMT)

2.3.3.1 The Construction Management Team (CMT), as defined and described herein, shall consist of separate entities (including SWACO's staff), whose specific division of duties shall be defined by SWACO. The CMT shall include SWACO, the Project Representative, the Project Engineer, and the Construction Manager and any of their designated representatives.

2.3.3.2 The Project Representative will function as SWACO's representative to the Contractor during the bidding, construction, commissioning, certification, and warranty phases of this work, and will also serve as the designated representative with respect to the Project during construction and until the issuance of the final Certificate of Payment.

2.3.3.3 All communications as between SWACO and Contractor shall be exclusively through the CMT, with either the Project Representative, Engineer and/or the Construction Manager.

2.3.4 Amending and Supplementing Contract Documents

2.3.4.1 The Contract Documents may be amended to provide for additions, deletions, and/or revisions in the Work or to modify the terms and conditions thereof in one of the following ways:

2.3.4.1(a) a written formal amendment;

2.3.4.1(b) a Change Order, as provided for herein;

2.3.4.1(c) a Work Change Directive, as provided for herein;

2.3.4.2 The requirements of the Contract Documents may be supplemented, and minor variations and deviations in the Work may be authorized, in one or more of the following ways:

2.3.4.2(a) A Field Order, as provided for herein;

2.3.4.2(b) Engineer's approval of a Shop Drawing or Sample;

2.3.4.2(c) Engineer's written interpretation or clarification.

2.3.5 As-Built Drawings

2.3.5.1 Contractor shall keep an accurate record of all approved changes made to the Drawings to show actual installation where installation varies from Work as originally shown, including the exact location and depth of underground utility lines.

2.3.5.2 During the performance of the Work, Contractor shall record any approved changes on the Drawings, neatly in colored pencil, noting new information not shown on the original Drawings.

2.3.5.3 Where Shop Drawings are used, the Contractor shall cross reference the corresponding sheet numbers on the Drawings. Contractor shall note related Change Order numbers where applicable.

2.3.5.4 Contractor shall keep a record of any change made to the Specifications, noting particularly any variation from manufacturer's installation instructions and recommendations.

2.3.5.5 As-Built Drawings should be open to inspection and be located on site.

2.3.6 Availability of Land; Subsurface and Physical Conditions; Reference Points

2.3.6.1 Owner shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and any such other land as may be dedicated for use by Contractor. Upon reasonable written request, Owner shall furnish Contractor with a correct statement of recorded legal title and legal description of the land upon which the Work is to be performed. Owner shall identify any encumbrances or restrictions not of general application but specifically related to the use of lands with which Contractor shall comply in performing the Work. Contractor shall provide for any and all additional land and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

2.3.6.2 Subsurface and Physical Conditions. Reference is to be made to the Supplementary Conditions for identification of:

2.3.6.2(a) Subsurface conditions: Those reports of explorations and tests of subsurface conditions at or contiguous to the site utilized by Engineer in preparing the Contract Documents; and

2.3.6.2(b) Physical Conditions: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) that have been utilized by Engineer and/or SWACO in preparing the Contract Documents.

2.3.6.3 Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the Supplementary Conditions. Except for such reliance on such "technical data", Contractor may not rely upon or make any claim against SWACO, or the CMT with respect to:

2.3.6.3(a) The completeness of such reports and drawings for the Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor, and safety precautions and programs incident thereto; or

2.3.6.3(b) other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or

2.3.6.3(c) any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.

2.3.6.4 Reference Points. SWACO shall provide engineering surveys to establish reference points for construction which in Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points, and shall make no changes or relocations without the prior written approval of SWACO. Contractor shall report to Engineer whenever any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

2.3.7 Differing Subsurface or Physical Conditions

2.3.7.1 If Contractor believes that any subsurface or physical condition at or contiguous to the site that is uncovered or revealed either:

2.3.7.1(a) is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in 2.3.6 above is materially inaccurate; or

2.3.7.1(b) is of such a nature as to require a change in the Contract Documents; or

2.3.7.1(c) differs materially from that shown or indicated in the Contract Documents; or

2.3.7.1(d) is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in Work of the character provided for in the Contract Documents; then Contractor shall, within twenty-four (24) hours after becoming aware thereof and before further disturbing the subsurface or physical conditions affected thereby or performing any Work in connection therewith, notify Engineer in writing about such condition. Contractor shall not further disturb such conditions or perform any Work in connection therewith, until receipt of a written ORDER TO DO SO.

2.3.7.2 Within forty-eight (48) hours after receipt of the written notice as provided above, Engineer shall review the pertinent condition, determine the necessity of SWACO obtaining additional exploration or tests with respect thereto, and advise SWACO and Contractor in writing of Engineer's findings and conclusions.

2.3.7.3 If Engineer concludes that a change in the Contract Documents is required as a result of a condition that meets one or more of the categories in paragraph 2.3.7.1, a Work Change Directive or Change Order will be issued as required herein to reflect and document the consequences of such change.

2.3.7.4 Possible Price and Time Adjustments. An equitable adjustment in the Contract Price or Times, or both, will be allowed to the extent that the existence of such uncovered or revealed condition causes an increase or decrease in Contractor's cost of, or time required for performance of, the Work, subject to the following:

2.3.7.4(a) Such condition must meet any one or more of the categories described in paragraphs 2.3.7.1(a) through 2.3.7.1(d), inclusive;

2.3.7.4(b) a change in the Contract Documents pursuant to paragraph 2.3.7.3 will not be an automatic authorization of nor a condition precedent to entitlement to any such adjustment;

2.3.7.4(c) with respect to Work that is paid for on a Unit Price basis, any adjustment in Contract Price will be subject to the provisions relating to Unit Price Work; and

2.3.7.4(d) Contractor shall not be entitled to any adjustment in the Contract Price or Times if:

(i) Contractor knew of the existence of such conditions at the time Contractor made a final commitment to SWACO relating to Contract Price and Times by the submission of a bid or becoming bound under a negotiated contract; or

(ii) the existence of such conditions could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the site and contiguous areas as required by the Bidding Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor making such a final commitment; or

(iii) Contractor failed to give the written notice within the time as required by paragraph 2.3.7.1.

If SWACO and Contractor are unable to agree on entitlement to or as to the amount or length of any such equitable adjustment in the Contract Price or Contract Times, a claim may be made under the provisions relating to the Cost of the Work. However, SWACO, Engineer and/or Engineer's

Consultants shall not be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

2.3.8. Physical Conditions – Underground Facilities

2.3.8.1 Shown or Indicated. The information or data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to SWACO or Engineer by the owners of such underground Facilities or by others. Unless it is otherwise expressly provided in the Supplementary Conditions:

2.3.8.1(a) SWACO and Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

2.3.8.1(b) The cost of all of the following will be included in the Contract Price and Contractor shall have full responsibility for:

- (i)** reviewing and checking all such information and data,
- (ii)** locating all Underground Facilities shown or indicated in the Contract Documents,
- (iii)** coordination of the Work with the owners of such Underground Facilities during construction, and
- (iv)** the safety and protection of all such Underground Facilities as provided herein and repairing any damage thereto resulting from the Work.

2.3.8.2 Not Shown or Indicated. If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents, Contractor shall, within twenty-four (24) hours after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as provided for herein), identify the owner of such Underground Facility and give written notice to that owner and to SWACO and Engineer. Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the Underground Facility. If Engineer concludes that a change in the Contract Documents is necessary, a Work Change Directive or Change Order will be issued as provided for in Article VIII to reflect and document such consequences. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility. Contractor shall be allowed an increase in Contract Price or an extension of the Contract Time, or both, to the extent they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and that Contractor did not know if and could not have reasonably been expected to be aware of or have anticipated. If SWACO and Contractor are unable to agree on entitlement to or the amount or length of any such adjustment in Contract Price or Contract Times, Contractor may make a claim therefor as provided herein. However, SWACO, Engineer and/or Engineer's Consultants shall not be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

ARTICLE III BONDS AND INSURANCE

3.1 PERFORMANCE, PAYMENT, AND OTHER BONDS

3.1.1 Contractor shall furnish Performance and Payment Bonds, each in an amount at least equal to the Contract Price, as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents. These Bonds shall remain in effect at least until one (1) year after the date when the final payment becomes due, except as provided otherwise by the applicable Laws or Regulations or the Contract Documents. Contractor shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the form prescribed by the Contract Documents, and shall be executed by such sureties as are named in the current list of "Companies

Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies” as published in Circular 570 (amended) by the Audit Staff, Bureau of Government Financial Operations, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of such agent’s authority to act.

3.1.1(a) If the surety on any Bond furnished by Contractor is declared bankrupt, becomes insolvent, or its right to do business is terminated in any state where any part of the Project is located, or it ceases to meet the requirements of paragraph 3.1.1, Contractor shall within ten (10) days thereafter substitute another Bond and surety, both of which must be acceptable to SWACO.

3.1.2 All bonds and insurance required by the Contract Documents to be purchased and maintained by Contractor shall be obtained from surety or insurance companies duly licensed or authorized to issue Bonds or insurance policies in the jurisdiction in which the Project is located for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

3.1.3 Contractor shall deliver to SWACO, with copies to each additional insured as identified in the Supplementary Conditions, if applicable, certificates of insurance and other evidence of insurance as requested by SWACO, which Contractor is required to purchase and maintain in accordance with paragraph 3.2 below.

3.1.4 Bond Reduction

3.1.4(a) Pursuant to Ohio Revised Code Section 153.80, and upon notice and consent of the Contractor’s Surety, SWACO, in its sole discretion, may reduce the Bond by up to twenty-five percent (25%) of the total amount of the Bond after at least fifty percent (50%) of the Work has been completed, and by up to fifty percent (50%) after at least seventy-five percent (75%) of the Work has been completed, provided that all of the following conditions are met:

(i) SWACO determines that the percentage of Work that has been completed at the time of determination has been satisfactorily performed and meets the terms of the Contract Documents, including all provisions regarding the time when the entire Project, or any specified portion of the Work, must be completed;

(ii) SWACO determines that no disputed claim caused by Contractor exists or remains unresolved;

(iii) The Bid upon which the Contract is based was not more than ten percent (10%) below the next lowest Bid or not more than ten percent (10%) below the cost estimate for the Work as published in the Notice to Bidders.

3.2 CONTRACTOR’S LIABILITY INSURANCE

Contractor shall purchase and maintain the following liability and other insurance at the indicated limits and under the terms set forth below:

3.2.1 General Liability Insurance, containing the following limits and terms:

3.2.1(a) \$1,000,000.00 per occurrence

3.2.1(b) \$2,000,000.00 aggregate

3.2.1(c) \$1,000,000.00 Products/Completed Operations Aggregate

3.2.1(d) Name SWACO as an additional insured

3.2.1(e) Waiver of subrogation in favor of SWACO and all related entities or subsidiaries, employees, agents and/or representatives

3.2.2 *Automobile Liability Insurance*, containing a limit of \$1,000,000.00 per occurrence.

3.2.3 *Worker’s Compensation and Employer’s Liability Insurance*, containing the following limits:

3.2.3(a) Statutory Limits for the State of Ohio

3.2.3(b) \$500,000.00/\$500,000.00/\$500,000.00 Employer’s Liability Limit

3.2.4 *Professional Liability or Professional Errors and Omissions Insurance* with the following limits:

3.2.4(a) \$5,000,000.00 per claim

3.2.4(b) \$5,000,000.00 aggregate

3.2.5 *Umbrella Liability Insurance* containing the following limits and terms:

3.2.5(a) \$4,000,000.00 per occurrence

3.2.5(b) Following Form Coverage as provided below

3.3 BUILDER'S RISK - NEW CONSTRUCTION

3.3.1 Unless otherwise specified in the Contract Documents, Contractor shall provide and maintain, during the progress of the Work and until the execution of the certificate of Contract Completion by SWACO, a builder's risk insurance policy to cover all Work in the course of construction including false-work, temporary buildings, and structures and materials used in the construction process, stored on or off site, or while in transit. Such insurance shall be on a "Risk of Direct Physical Loss" form policy and shall insure against the perils of fire and extended coverage and physical loss or damage including, without limitation, theft, vandalism, malicious mischief, earthquake, tornado, lightning, explosion, breakage of glass, flood, collapse, and water damage. It shall also include debris removal, demolition occasioned by enforcement of any applicable legal requirement, and shall cover reasonable compensation for SWACO's services and expenses required to limit further loss.

3.3.1(a) Coverage must include provision to pay the reasonable extra costs of expediting temporary and/or permanent repairs to, or permanent replacement of, damaged property. This shall include overtime wages and the extra cost of "express" or other means for rapidly transporting materials and supplies necessary to such repair or replacement.

3.3.1(b) Such builder's risk policy shall protect the Contractor, SWACO, and the CMT from loss and provide coverage for materials in transit or stored off site and identified for the Project.

3.3.1(c) Coverage for other perils may be required if specified in the Supplemental Conditions.

3.3.2 Unless otherwise specified in the Contract Documents, the builder's risk policy shall be written in an amount equal to 100 percent (100%) of the Contract Price, including landscaping, paving, and other Project Work.

3.3.3 The Builder's Risk policy shall specifically permit and allow for partial occupancy by SWACO prior to acceptance of the Project by SWACO.

3.4 INSURANCE POLICY REQUIREMENTS

3.4.1 Each policy of insurance required to be purchased and maintained by the Contractor shall:

3.4.1(a) Be purchased from an insurance carrier rated by A.M. Best as A-, VII or better

3.4.1(b) Each policy and respective certificate of insurance shall expressly provide that should Contractor's insurance lapse, be cancelled, non-renewed or materially altered, Contractor shall provide SWACO with no less than thirty (30) days prior written notice of such cancellation, non-renewal, expiration or material alteration of the coverage contained in such policy or evidenced by such certificate of insurance.

3.4.1(c) Within fifteen (15) days of the execution of this Contract by SWACO's Executive Director or his designee, Contractor shall without demand furnish SWACO with a certified copy of any insurance certificate and/or additional insured endorsement required to be purchased or maintained by Contractor under the terms of this Contract. Failure of Contractor to comply with the terms and conditions of this paragraph shall constitute a material breach of this Contract and shall be cause for termination of this Contract by SWACO.

3.4.2 Contractor shall maintain all insurance in the required amounts, without interruption, from the date of the execution of this Contract until the date of the termination of this Contract or the date of

payment of the final invoice issued by Contractor, whichever is later. Failure of Contractor to comply with the terms and conditions of this paragraph shall constitute a material breach of this Contract and shall be cause for termination of this Contract by SWACO.

3.4.3 Insurance policies required to be purchased and maintained by Contractor may include a reasonable loss deductible, as is customary for Contractor's industry, which shall be the sole responsibility of Contractor to pay in the event of any covered loss.

3.4.4 SWACO and Contractor waive all rights against each other for damages caused by fire or other perils to the extent of actual recovery of any insurance proceeds under any property insurance obtained pursuant to the requirements set forth above or any other property insurance applicable to the performance of the Services, except such rights as they have to proceeds of such insurance held by SWACO as fiduciary. Contractor agrees to obtain waivers in favor of SWACO of such claims by all of its Subcontractors.

3.4.5 Notwithstanding paragraph 3.4.4 above, and regardless of the amount of any insurance proceeds recovered by the parties under the insurance policies set forth above, Contractor shall be liable to SWACO for the full amount of any claims, damages, losses, liens, causes of action, suits, judgments and expenses (including reasonable attorney's fees and other reasonable costs of defense) of any nature, kind or description which are in excess of such insurance proceeds.

3.4.6 Correction, Repair or Replacement of Insured Losses. Contractor shall promptly correct, repair and/or replace any items, work, and/or materials installed as part of the Services and damaged and/or destroyed as a result of an insured loss or damage. Such correction, repair and/or replacement shall be Contractor's sole responsibility and shall be undertaken and completed at no additional cost to SWACO.

ARTICLE IV CONTRACTOR'S RESPONSIBILITIES

4.1 CONSTRUCTION SUPERVISION

4.1.1 Contractor shall supervise, inspect, and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for, and have control over, all construction means, methods, techniques, sequences, and procedures of construction and for all portions of the Contractor's Work. Contractor shall not be responsible for the negligence of others in the design or specification of a specific means, method, technique, sequence, or procedure of construction which is shown or indicated and expressly required by the Contract Documents, but Contractor shall be responsible for any injury or damage which may result from improper construction, installation, maintenance, or operation of Contractor's Work to the fullest extent permitted by law.

4.1.1(a) Contractor shall provide continuous supervision at the Project site by a competent superintendent(s) when any Work is being performed, unless such requirement is waived by SWACO in writing.

4.1.1(b) Contractor's superintendent shall have responsibility and authority to act on behalf of the Contractor. All communications and notices to the Contractor's superintendent shall be as binding as if given directly to the Contractor.

4.1.1(c) Contractor shall submit an outline of the qualifications and experience of Contractor's proposed superintendent, including references, to SWACO within ten (10) Days of issuance of the Notice to Proceed or within five (5) Days of the designation of a replacement superintendent for any reason.

(i) SWACO reserves the right to reject Contractor's proposed superintendent. Failure of SWACO to notify Contractor of such rejection within ten (10) Days of receipt of the required information shall indicate that SWACO has no such objection.

(ii) If SWACO rejects Contractor's superintendent, Contractor shall provide a replacement superintendent at no additional cost to SWACO.

4.1.1(d) Contractor shall not replace the Contractor's designated superintendent without the written approval of SWACO. If Contractor proposes to change its superintendent, Contractor shall submit to SWACO written justification for the replacement, along with the outline required pursuant to paragraph 4.1.1(c) above.

4.1.2 Contractor shall provide competent, suitably qualified personnel to survey, lay out, and construct the Work as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the Site. Except as otherwise required for the safety or protection of persons, the Work, or property at the Site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the Site shall be performed during regular working hours and Contractor shall not permit overtime or the performance of Work on Saturday, Sunday, or any legal holiday without SWACO's written consent given after prior written notice to Engineer.

4.1.3 Unless otherwise specified in the Contract Documents, Contractor shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, lighting, heat, telephone, water, sanitary facilities, temporary facilities, and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up, and completion of the Work.

4.1.4 All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of SWACO. If required by Engineer, Contractor shall furnish satisfactory evidence, including reports of required tests, as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

4.1.4(a) Contractor shall be responsible for the proper storage of all material and equipment brought to the Project.

4.1.4(b) After material or equipment is no longer required for the Work, Contractor shall remove such material and equipment from the Project.

4.1.4(C) ONLY MATERIALS AND EQUIPMENT WHICH ARE TO BE USED DIRECTLY IN THE WORK OR ARE REQUIRED TO PERFORM THE WORK (I.E. FORMS, SCAFFOLDING, ETC.) SHALL BE BROUGHT TO OR STORED AT THE PROJECT BY CONTRACTOR, CONTRACTOR'S SUBCONTRACTORS, AND CONTRACTOR'S SUPPLIERS.

4.1.5 Contractor shall take field measurements, verify field conditions, and carefully compare such field measurements, conditions, and other information known to Contractor with the Contract Documents before commencing activities. Errors, inconsistencies, or omissions discovered shall be reported to the Engineer immediately.

4.1.5(a) Unless otherwise specified in the Contract Documents, Contractor shall be responsible for properly and accurately laying out all lines, levels, elevations, and measurements for all of Contractor's Work as required by the Contract Documents.

4.2 PROGRESS SCHEDULE

4.2.1 Contractor shall adhere to the Progress Schedule established in accordance with paragraph 2.2.6.5 as it may be adjusted from time to time as provided below:

4.2.1(a) Contractor shall submit to Engineer for acceptance, to the extent indicated in paragraphs 2.2.6.2 through 2.2.6.5, proposed adjustments in the Progress Schedule that will not change the Contract Times or Milestones. Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

4.2.1(b) Proposed adjustments in the Progress Schedule that will change the Contract Times or Milestones shall be submitted in accordance with the requirements herein relating to Change of Contract Times. Such adjustments may only be made by a Change Order or Written Amendment in accordance with said provisions.

4.2.2 Contractor shall allow sufficient time for installation, inspection, or testing of any Work by Engineer and/or the CMT before covering or closing any applicable portion of the Project.

4.2.3 CONTRACTOR SHALL NOT CUT AWAY ANY TIMBER OR DIG UNDER ANY FOUNDATION OR INTO ANY WALL, OR OTHER PART OF THE PROJECT, WITHOUT NOTIFYING ENGINEER IN WRITING.

4.2.4 Contractor shall install the Work in accordance with the Contract Documents and any installation recommendations of the manufacturer, including required dryness for installation of the various materials.

4.2.5 CONTRACTOR SHALL COMPLY WITH ALL REQUIREMENTS AND CONDITIONS OF THE NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT, INCLUDING, BUT NOT LIMITED TO, IMPLEMENTING AND MAINTAINING THE CONTROL MEASURES SPECIFIED IN THE STORM WATER POLLUTION PREVENTION PLAN, MAINTAINING RECORDS OF CONSTRUCTION ACTIVITIES, REMOVING MATERIALS NO LONGER REQUIRED, AND TAKING PROPER ACTION IF THERE IS A REPORTABLE QUANTITY SPILL.

4.3 SUBSTITUTES AND “OR EQUAL” ITEMS

4.3.1 Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function, and quality required. Unless the specification or description contains or is followed by words to the effect that no like, equivalent, “or-equal” item or that no substitution is permitted, other items of materials or equipment, or materials or equipment of other Suppliers, may be accepted by Engineer under the following circumstances:

4.3.1(a) “Or-Equal.” If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.

4.3.1(b) Substitute Items. If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under 4.3.1(a), it will be considered a proposed Substitute item. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. The procedure for review by Engineer shall include the following as supplemented as Engineer may decide is appropriate under the circumstances:

(i) Requests for review of proposed Substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall first make written application to Engineer for acceptance thereof, certifying that the proposed Substitute will

adequately perform the functions and achieve the results called for by the general design, be similar in substance to that specified, and be suited to the same use as that specified.

(ii) The application shall state the extent, if any, to which the evaluation and acceptance of the proposed Substitute will prejudice Contractor's achievement of Substantial Completion on time, whether acceptance of the Substitute for use in the Work will require a change in any of the Contract Documents, or in the provisions of any other direct contract with SWACO for work on the Project, to adapt the design to the proposed Substitute, and whether incorporation or use of the Substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed Substitute from that specified will be identified in the application and available maintenance, repair, and replacement service will be indicated.

(iii) The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such Substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by Engineer in evaluating the proposed substitute. Engineer may require Contractor to furnish additional data about the proposed Substitute.

All data to be provided by Contractor in support of any proposed "or-equal" or Substitute items will be at Contractor's expense.

4.3.2 Substitute Construction Methods or Procedures. If a specific means, method, technique, sequence, or procedure of construction is shown or indicated in and expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence, or procedure of construction acceptable to Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by Engineer will be similar to that provided for in paragraph 4.3.1(b). Notwithstanding any determination by Engineer under this paragraph, Contractor shall remain solely responsible for all means, methods, techniques, sequences or procedures of construction and shall be responsible for any claims, damages, losses, or schedule impacts that may result from the same.

4.3.3 Engineer's Evaluation. Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 4.3.1(b) and 4.3.2. Engineer will be the sole judge of acceptability, and no "or-equal" or Substitute will be ordered, installed, or utilized without Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. SWACO may require Contractor to furnish, at Contractor's expense, a special performance guarantee or other surety with respect to any "or-equal" or Substitute. Engineer will record the time required by Engineer and/or Engineer's consultants in evaluating Substitutes proposed or submitted by Contractor pursuant to paragraphs 4.3.1(b) and 4.3.2, and in making changes to the Contract Documents, or in the provisions of any other direct contract with SWACO for work on the Project, occasioned thereby. Regardless of Engineer's acceptance of a Substitute item so proposed or submitted by Contractor, Contractor shall reimburse SWACO for the charges of Engineer and/or Engineer's consultants for evaluating each such proposed Substitute item.

4.4 PROTECTION OF THE PROJECT

4.4.1 Contractor shall protect the Work from weather, and shall maintain the Work and all materials, apparatus, and fixtures free from injury or damage during the entire construction period.

4.4.1(a) Work likely to be damaged shall be covered or protected at all times to prevent damage.

4.4.1(b) Any Work damaged by failure of Contractor to provide coverage or protection shall be removed and replaced with new Work at Contractor's expense.

4.4.1(c) Any adjacent property, including, without limitation, facilities, roads, walks, shrubbery, plants, trees, or turf, damaged during and/or as a result of the Contractor's performance of the Work shall be promptly repaired or replaced at Contractor's expense.

4.4.2 Contractor shall protect the Project and existing or adjacent property from damage at all times and shall erect and maintain necessary barriers, furnish and keep lighted necessary danger signals at night, and take precautions to prevent injury or damage to persons or property.

4.4.3 Contractor shall not load, nor permit any part of the Project to be loaded, in any manner that will endanger the Project, or any portion thereof, nor shall the Contractor subject any part of the Project or existing or adjacent property to stress or pressure that will endanger the property.

4.4.4 Contractor shall provide all temporary bracing, shoring, and other structural support required for the safety of the Project and proper execution of the Work.

4.5 MATERIAL, EQUIPMENT, AND CLEAN UP OF THE PROJECT

4.5.1 Use of the Premises. Contractor shall confine construction equipment, the storage of materials and equipment, and the operations of workers to the Site and land areas identified in and permitted by the Contract Documents and other land and areas as permitted by any applicable Laws and Regulations, rights-of-way, permits, and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall have the responsibility to promptly settle or resolve the claim with the other such party.

4.5.2. Contractor's materials and equipment shall not cause damage to the Project or adjacent property and shall not endanger any person at, or in the vicinity of, the Project.

4.5.2(a) Each of the equipment items and materials necessary for the construction as set forth in paragraph 4.1.4 above shall be in good working order, be properly maintained, and free from leaks and/or dripping fuel, oil, anti-freeze, hydraulic fluid, or other fluids onto or about the Project. Any leakage of fuel, oil, anti-freeze, hydraulic fluid, and/or other fluids shall be immediately cleaned by Contractor and the cause of such leak immediately repaired.

4.5.2(b) Contractor shall be responsible for the proper storage of all materials, paints, solvents, cleaners, hardeners and/or other such items on or about the Project. Any spills of such items shall be immediately cleaned up by Contractor.

4.5.2(c) If Contractor fails to follow the provisions and/or conditions set forth in paragraphs 4.5.2(a) and 4.5.2(b) of these General Conditions, SWACO may, at its option, clean up and remove any spills and/or debris on or about the Project and deduct the costs thereof from any payments owed to Contractor then or thereafter coming due.

4.5.3 Any injury to a person or persons or damage to property resulting from Contractor's material or equipment shall be the responsibility of Contractor. This provision is intended to be, and shall be construed as, consistent with, and not in conflict with, Ohio Revised Code Section 4113.62.

4.5.4 Clean Up. During the progress of the Work, Contractor shall keep the premises free from accumulation of waste materials, rubbish, and other debris resulting from the Work. At the completion of the Work, Contractor shall remove all waste materials, rubbish, and debris from and about the premises as well as all tools, appliances, construction equipment, machinery, and surplus materials. Contractor shall leave the Site clean and ready for occupancy by SWACO at the Substantial Completion of the Work. Contractor shall restore to original condition all property not designated for alteration by the Contract Documents.

4.5.4(a) If Contractor fails to maintain the areas adjacent to the Project and the Project site clean and free of waste materials and rubbish, SWACO shall direct the local jurisdiction having

responsibility for the area to clean the area. The cost of cleaning the area adjacent to the Project shall be deducted from any monies due the Contractor in an amount SWACO determines to be just. The decision of SWACO shall be final.

4.6 LABOR

4.6.1 Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers, and other persons or organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor. Contractor shall require all Subcontractors, Suppliers, and other persons or organizations performing or furnishing any of the Work to communicate with Engineer directly through Contractor.

4.6.2 Contractor shall maintain a sufficient workforce to efficiently execute the Work in accordance with the Construction Schedule.

4.6.3 Contractor shall enforce good discipline and order among Contractor's employees, Contractor's Subcontractor's employees, and Contractor's Suppliers. Contractor shall not permit employment of unfit persons or persons not skilled in the tasks assigned to them.

4.6.4 SWACO may, upon written notice, require Contractor to dismiss from the Project any person employed by Contractor, Contractor's Subcontractors and/or Contractor's Suppliers, who is found by SWACO, pursuant to a recommendation from Engineer and/or the CMT, to be incompetent, guilty of misconduct, careless, or detrimental to the construction or the Work of the Project.

4.6.4(a) Contractor shall not employ any Subcontractor, Supplier, or other person or organization, whether initially or as a substitute, against whom SWACO, in its sole discretion, may have reasonable objection.

4.6.5 If the Supplementary Conditions require the identity of certain Subcontractors, Suppliers, or other persons or organizations, including those who are to furnish the principal items of material or equipment, to be submitted to SWACO in advance of the specified date, and/or prior to the Effective Date of the Agreement, for acceptance by SWACO and/or Engineer, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, acceptance by SWACO or Engineer, either in writing or by failure to make a written objection thereto by the date indicated for acceptance or objection in the bidding documents or the Contract Documents, of any such Subcontractor, Supplier, or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case Contractor shall submit an acceptable substitute, the Contract Price will be adjusted by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued or written amendment signed. No acceptance by SWACO or Engineer of any such Subcontractor, Supplier, or other person or organization shall constitute a waiver of any right of SWACO or Engineer to reject defective Work.

4.6.6 Contractor shall employ all legal efforts to minimize the likelihood or effect of any strike, Work stoppage, or other labor disturbance. Informational pickets shall not justify any Work stoppage.

4.6.7 Contractor shall be fully responsible to SWACO and Engineer for all acts and omissions of the Subcontractors, Suppliers, and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor, just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other person or organization any contractual relationship between SWACO any such Subcontractor, Supplier, or other person or organization, nor shall it create any obligation on the part of SWACO to pay any monies due any such Subcontractor, Supplier, or other person or organization except as otherwise may be required.

4.6.8 The divisions and sections of the Specifications and the identifications of any Drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

4.6.9. All Work performed for Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds said parties to the applicable terms and conditions of the Contract Documents for the benefit of SWACO.

4.6.10 Local and State Permits. Unless otherwise specified in the Contract Documents or Supplementary Conditions, and except as provided in paragraph 4.6.10(a), Contractor shall obtain, maintain, and pay for any permit or license required by local and state authorities having jurisdiction over the Project, including, but not limited to any required demolition permit. SWACO shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of the opening of the Bids, or if there are no Bids, on the Effective Date of the Agreement. Contractor shall pay all charges of utility owners for connections to the Work, and SWACO shall pay all charges of such utility owners for capital costs related thereto.

4.6.10(a) Building Permits. SWACO shall secure required general building permits, and any required "permit to install."

4.6.10(b) Contractor shall schedule the intermediate and final inspections required for any permit certification. Contractor shall give Engineer and/or the CMT reasonable notice of the date arranged for any inspection.

4.7 COMPLIANCE WITH LAWS AND REGULATIONS

4.7.1 Contractor shall give all notices and comply with all Laws and Regulations, including all applicable federal, State, and local laws, as well as Environmental Laws, rules, permits, ordinances, and regulations relating to or regulating the construction, operation, and/or performance of the Work for the Project. Except when required, SWACO shall not be responsible for monitoring Contractor's compliance with said Laws or Regulations.

4.7.2 If Contractor performs any Work knowing or having reason to know that said is contrary to any Laws or Regulations, Contractor shall bear all claims, costs, losses, and damages caused by, arising out of, or resulting therefrom.

4.7.3 Contractor shall pay all sales, consumer, use, and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the locale of the Project which are applicable during the performance of the Work.

4.8 SAFETY AND PROTECTION

4.8.1 Contractor shall be fully and solely responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protections to prevent damage, injury, or loss to:

4.8.1(a) All persons on the Work site or who may be affected by the Work;

4.8.1(b) All the Work, materials, and equipment to be incorporated therein, whether in storage on or off the site; and

4.8.1(c) Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities, and Underground Facilities not designated for removal, relocation, or replacement in the course of the construction.

Contractor shall comply with all applicable provisions of Federal, State, and municipal safety laws and buildings codes.

4.8.2 Contractor shall comply with the rules and regulations of the Department of Labor and the Occupational Safety and Health Act (OSHA) and shall be solely responsible for any fine or cost incurred as a result of any violation or alleged violation rules and/or regulations.

4.8.3 Prior to starting the Work, Contractor shall inform and/or provide all of Contractor's Subcontractors with the methods and equipment for protecting the Project and persons from fire damage in accordance with applicable federal, State and local fire regulations.

4.8.4 Methods and equipment for protecting persons and the Project shall be subject to the inspection and approval of the appropriate governmental authority having jurisdiction over the Project site.

4.8.5 Contractor shall remove all snow and ice as may be required for access to the Project.

4.8.6 Contractor shall not permit or allow any person, including any person licensed to carry a concealed handgun by this state or any other state, to possess, have under his or her control, convey, attempt to convey, or bring a handgun or any other firearm, whether openly or concealed, into any building or structure located on or about the site or the Work Area. This restriction shall not apply to any law enforcement person who is currently acting within his or her scope of duties or any governmental employee who is authorized to carry a firearm as part of his or her scope of duties and who is currently acting pursuant to said duties. Further, the Contractor shall not permit or allow any person to possess, have under his or her control, convey, attempt to convey, or bring a handgun or any other firearm, whether openly or concealed, into, onto or about the grounds of the Site or the Work Area. This restriction shall not apply to any law enforcement person who is currently acting within his or her scope of duties or any governmental employee who is authorized to carry a firearm as part of his or her scope of duties and who is currently acting pursuant to his or her scope of duties; or to any person who has a valid license issued by this state or a state which has entered into an appropriate agreement with the Attorney General of the State of Ohio to carry a concealed handgun, and who is carrying a handgun onto the grounds of these premises.

4.8.7 Contractor shall delineate smoking areas on the Project site and limit smoking and related activities to those areas. Contractor shall submit location of these areas for approval by Engineer.

4.8.8 Contractor shall comply with all applicable Laws and Regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury or loss, and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property, Underground Facilities, and/or utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation, and replacement of their property. All damage, injury, or loss to any property referred to in paragraphs 4.5.2, 4.5.3, or as otherwise provided herein, caused, directly or indirectly in whole or in part, by Contractor, any Subcontractor, Supplier, or other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work, or anyone for whose acts any of them may be liable, shall be remedied by Contractor, except damage or loss attributable to the fault of the Drawings or Specifications, or to the acts or omissions of SWACO. Contractor's duties and responsibilities for safety and for the protection of the Work shall continue until such time as all the Work is completed and Engineer has issued a notice to SWACO and Contractor in accordance with the provisions herein that the Work is acceptable, except as otherwise may be expressly provided in connection with the Supplementary Conditions.

4.9 HAZARDOUS MATERIALS

4.9.1 Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the site in accordance with all applicable Laws or Regulations.

4.9.2 In the event Contractor encounters materials reasonably believed to be containing asbestos, polychlorinated biphenyl (PCB), or other hazardous waste or material which has not been rendered harmless, Contractor shall immediately stop Work in the area affected and report the condition to Engineer immediately and provide written notification within twenty-four (24) hours.

4.9.3 The Work in the affected area shall be resumed upon written notice from SWACO to Contractor. If SWACO and Contractor cannot agree as to entitlement, amount, and/or extent of an

adjustment, if any, in Contract Price or extension of the Contract Times as a result of such stoppage of the Work, either party may make a claim as provided in Articles IX and X. The provisions of this paragraph 4.9.3 are not intended to apply to materials uncovered or revealed at the Project which are or could be hazardous waste or materials when such waste materials are identified in the Supplementary Conditions of the Contract Documents.

4.9.4 The term “rendered harmless” shall mean that the level of exposure is less than any applicable exposure standards set forth in OSHA or other applicable regulations.

4.10 EMERGENCIES

4.10.1 In the event of an emergency affecting the safety or protection of persons, the work, property at the Site, or adjacent property thereto, Contractor, without special instruction or authorization from SWACO, shall act to prevent any threatened damage, injury, or loss.

4.10.2 Contractor shall give Engineer prompt written notice if Contractor believes that any significant change in the Work or variation from the Contract Documents has been caused by any action taken in response to an emergency.

4.10.3 If Engineer recommends that a change in the Contract Documents be made or determines that a change in the Contract Documents is required because of any emergency or action taken by Contractor in response to such an emergency, and SWACO agrees, a Work Change Directive or Change Order shall be issued pursuant to the applicable provisions herein which document the consequences of such actions.

4.11 SHOP DRAWINGS AND SAMPLES

4.11.1 Ownership

4.11.1(a) All Shop Drawings, Samples, and Specifications are the property of SWACO.

4.11.1(b) In making copies of the Shop Drawings and Specifications available, SWACO does not confer a license, or grant Work on the Project.

4.11.2 Shop Drawings and Samples

4.11.2(a) Contractor shall submit Shop Drawings to Engineer for review and approval in accordance with the accepted schedule for Shop Drawings and Sample submittals. All submittals shall be identified as Engineer may require and in the specified number of copies. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials, and similar data in order to show Engineer the materials and equipment Contractor proposes to provide and enable Engineer to review the information for the purposes as provided herein.

4.11.2(b) Contractor shall also submit Samples to Engineer for review and approval in accordance with said accepted schedule of Shop Drawings and Sample submittals. Each Sample will be clearly identified as to material, Supplier, pertinent data such as catalog numbers, the use for which intended, and otherwise as Engineer may require in order to review the submittal for the purposes as provided herein. The numbers of each Sample to be submitted will be as specified in the Specifications.

4.11.2(c) Contractor shall maintain in good order at the Project site one (1) copy of all Drawings, Specifications, Bulletins, Addenda, approved Shop Drawings, catalog data, manufacturer operating and maintenance instructions, certificates, Warranties, Change Orders, Field Orders, Engineer’s interpretations, As-Built Drawings, and all other Contract Documents.

4.11.2(d) Contractor shall at all times permit access to the Contract Documents located at the Project site to authorized representatives of SWACO and the CMT.

4.11.2(e) Shop Drawings, Samples and other submittals shall be provided by the Contractor for any item required by the Contract Documents but not fully described in the drawings and Specifications, unless waived by the Project Engineer, and shall include, without limitation:

- (i) Construction of the various parts, method of joinery, type of material, grade, quality, and thickness of material, alloy of material, profiles of all sections, reinforcement, method of hanging doors or installing windows, anchorage, type and grade of finish.
- (ii) Capacities, types of materials, and performance charts that are pertinent to the materials and performance charts that are pertinent to each item of equipment.
- (iii) Wiring diagrams, control diagrams, schematic diagrams, working and erection dimensions, arrangement and Specifications.
- (iv) Other pertinent technical information and data.

4.11.3 Submittal Procedures

4.11.3(a) Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

- (i) all field measurements, quantities, dimensions, specified performance criteria, installations requirements, materials, catalog numbers, and/or similar information;
- (ii) all materials with respect to intended use, fabrication, shipping, handling, storage, assembly, and installation pertaining to the performance of the Work; and
- (iii) all information relative to Contractor's sole responsibilities relating to means, methods, techniques, sequences, and procedures of construction, as well as safety precautions and programs.

Contractor shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings, Samples, the requirements of the Work and the Contract Documents.

4.11.3(b) Each submittal shall bear a stamp or a specific written indication that Contractor has satisfied its obligations under the Contract Documents with respect to review and approval of that submittal.

4.11.3(c) At the time of each submittal, Contractor shall give Engineer a separate, specific written notice of any variations that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents. Further, a specific notation shall be made on each Shop Drawing and Sample submitted to the Engineer for review and approval of each such variation.

4.11.3(d) Engineer will review and approve Shop Drawings and Samples in accordance with the schedule of submittals accepted by Engineer. Engineer's review and approval shall be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of the completed Project as a functioning whole. Engineer's review and approval will not extend to means, methods, techniques, sequences, or procedures of construction (except where said is expressly called for by the Contract Documents), or to safety precautions or programs incident thereto. The review and approval of a separate item will not indicate approval of the assembly in which the item functions. Contractor shall make the corrections as required by Engineer, and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

4.11.3(e) Engineer's review and approval of Shop Drawings or Samples shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has notified Engineer in writing of each variation at the time of submission and Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying the Shop Drawing or Sample approval. Any approval by

Engineer shall not relieve Contractor from responsibility to comply with the requirements of this section 4.11.3.

4.11.3(f) Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submissions as accepted by Engineer per paragraph 2.2.6.2, any related Work performed prior to Engineer's review and approval of the pertinent submittal shall be at the sole expense and responsibility of Contractor.

4.11.3(G) Form of Submittals. Contractor shall provide a submittal letter and shall stamp and submit shop drawings or other submittals to engineer for review and comment in accordance with the established schedule.

(i) Unless otherwise specified in the Contract Documents, Contractor shall submit one (1) mylar and three (3) prints of all Shop Drawings and four (4) copies of any other submittal.

(ii) Unless otherwise specified in the Contract Documents, Contractor shall prepare one-fourth inch equals one-foot scale drawings of all sheet metal Work with plan and elevation dimensions to specifically locate all duct Work, equipment and HVAC pipe Work, either on the same or separate drawings.

(iii) Contractor will provide the drawings to SWACO and Engineer to specifically locate equipment, piping, conduit and other Work.

4.12 CONTINUING THE WORK

4.12.1 Contractor shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with SWACO. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by Article XIII pertaining to Suspension of Work and Termination or as SWACO and Contractor may otherwise agree to in writing.

4.13 CONTRACTOR'S GENERAL WARRANTY AND GUARANTEE

4.13.1 Contractor warrants and guarantees to SWACO that all Work will be in accordance with the Contract Documents and will not be defective. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

4.13.1(a) abuse, modification, or improper maintenance or operation by persons other than Contractor, Subcontractors, or Suppliers; or

4.13.1(b) normal wear and tear under normal usage.

4.13.2 Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following shall constitute an acceptance of Work that is not in accordance with the Contract Documents or be considered a release of Contractor's obligations to perform the Work in accordance with the Contract Documents:

4.13.2(a) observations by Engineer,

4.13.2(b) recommendation of any progress or final payment by Engineer,

4.13.2(c) the issuance of a Certificate of Substantial Completion or any payment by SWACO to Contractor under the Contract Documents,

4.13.2(d) use or occupancy of the Work or any part thereof by SWACO,

4.13.2(e) any acceptance by SWACO or any failure to do so,

4.13.2(f) any review and approval of a Shop Drawing or Sample submittal, or the issuance of a notice of acceptability by Engineer pursuant to the terms contained herein,

4.13.2(g) any inspection, test, or approval by others, or

4.13.2(h) any correction of defective Work by SWACO.

4.14 INDEMNIFICATION

TO THE FULLEST EXTENT PERMITTED BY LAW, AND CONSISTENT WITH OHIO REVISED CODE SECTION 2305.31, THE CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS SWACO, ITS TRUSTEES, OFFICERS, CONSULTANTS, AGENTS, REPRESENTATIVES, ATTORNEYS AND EMPLOYEES, IN BOTH INDIVIDUAL AND OFFICIAL CAPACITIES, FROM AND AGAINST ALL CLAIMS, DAMAGES, LOSSES LIENS, CAUSES OF ACTION, SUITS, JUDGMENTS AND EXPENSES (INCLUDING, BUT NOT LIMITED TO, REASONABLE ATTORNEYS' FEES, AND OTHER REASONABLE COSTS), OF ANY NATURE, KIND OR DESCRIPTION, WHICH (A) ARE CAUSED BY OR RESULT FROM THE PERFORMANCE OF THE SERVICES OF CONTRACTOR, ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY THE CONTRACTOR, ANY CONTRACTOR'S SUB-CONTRACTOR, OR ANYONE FOR WHOSE ACTS THE CONTRACTOR IS LEGALLY LIABLE, AND (B) ARE ATTRIBUTABLE TO BODILY INJURY, PERSONAL INJURY, SICKNESS, DISEASE OR DEATH OF ANY PERSON, OR TO DAMAGE TO OR DESTRUCTION OF PROPERTY, BUT (C) ONLY TO THE EXTENT THEY ARE CAUSED BY ANY NEGLIGENT, RECKLESS OR WILLFUL ACT, ERROR OR OMISSION OF THE CONTRACTOR, ANYONE DIRECTLY OR INDIRECTLY EMPLOYED BY THE CONTRACTOR, ANY CONTRACTOR'S SUB-CONTRACTOR, OR ANYONE FOR WHOSE ACTS THE CONTRACTOR IS LEGALLY LIABLE. THE TERM, CONDITIONS AND PROVISIONS OF THIS PARAGRAPH SHALL SURVIVE THE TERMINATION OF THIS AGREEMENT FOR ANY REASON.

4.15 SURVIVAL OF OBLIGATIONS.

All representations, indemnifications, warranties, and guarantees made in, required by, or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion, and acceptance of the Work and termination or completion of the Agreement.

ARTICLE V OTHER WORK

5.1 RELATED WORK AT SITE.

SWACO may perform other work related to the Project at the Site, or through direct contracts with others or utility owners. If other such work is to be performed and was not noted in the Contract Documents, then (i) written notice thereof will be given to Contractor prior to starting any other such work, and (ii) Contractor may make a claim therefor as provided herein if Contractor believes that such performance will involve additional expense to Contractor or requires additional time and the parties are unable to agree as to the amount or extent thereof.

5.1.1 Contractor shall afford each other contractor and utility owner proper and safe access to the Site and a reasonable opportunity for the introduction and storage of materials and equipment, the execution of such other work, and shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents, Contractor shall do all the cutting, fitting, and patching of the Work that may be required to make its parts come together properly and integrate with other such work. Contractor shall not endanger any work of others by cutting, excavating, or otherwise altering their work, and will only do so with the written consent of Engineer and the others whose work is to be affected. The duties and responsibilities of Contractor under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in SWACO's contracts with other such contractors or utility owners.

5.1.2 If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article V, Contractor shall inspect such other work and promptly report

to Engineer in writing any delays, defects, or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure to so report will constitute an acceptance of other such work as fit and proper for integration with Contractor's Work, except for latent defects and deficiencies in such other work.

5.1.3 If SWACO contracts with others for the performance of other work on the Project at the site, the following will be set forth in the Supplementary Conditions:

5.1.3(a) identification of the person, firm, or corporation who will have authority and responsibility for coordination of the activities among the various prime contractors;

5.1.3(b) itemization of the specific matters to be covered by such authority and responsibility; and

5.1.3(c) the extent of such authority and responsibilities will be provided.

Unless otherwise provided in the Supplementary Conditions, SWACO shall have sole authority and responsibility in respect of such coordination.

ARTICLE VI OWNER'S RESPONSIBILITIES

6.1 Except as otherwise provide in these General Conditions, SWACO shall issue all communications to Contractor through Engineer.

6.2 In case of termination of the employment of Engineer, SWACO shall appoint an engineer against whom Contractor shall make no reasonable objections, whose status under the Contract Documents shall be that of the former Engineer.

6.3 SWACO shall furnish the data required under the Contract Documents promptly and shall make payments to Contractor when they are due pursuant to SWACO's Accounts Payable policies and the terms as stated herein. In the event that the terms herein conflict with the referenced policies, the SWACO Accounts Payable policies shall govern.

6.4 SWACO's shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with the applicable Laws and Regulations relating to the furnishing or performance of the Work. SWACO shall not be responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents.

ARTICLE VII ENGINEER'S STATUS DURING CONSTRUCTION

7.1 Engineer will be SWACO's representatives during the construction period. The duties, responsibilities, and limitations of authority of Engineer as SWACO's representative during construction are set forth in the Contract Documents and will not be changed without the written consent of SWACO and Engineer.

7.2 Engineer will make visits to the Site at intervals appropriate to the various stages of construction as Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Engineer will endeavor for the benefit of SWACO to determine, in general, if the Work is proceeding in accordance with the Contract Documents. Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. Engineer's efforts will be directed toward providing SWACO a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of

such visits and observations, Engineer will keep SWACO informed of the progress of the Work and will endeavor to guard SWACO against defective Work.

7.2.1 Should SWACO so request, Engineer shall furnish a Project Representative to assist Engineer in providing more continuous observation of the Work. The responsibilities, authority, and limitations thereon of any such Project Representative and assistants will be as provided herein and in the Supplementary Conditions. If SWACO designates another representative or agent to represent SWACO at the site who is not Engineer's Consultant, agent, or employee, the responsibilities, authority, and limitations thereon of other such person will be as provided in the Supplementary Conditions.

7.3 Engineer's visits and on-site observations are subject to all of the limitations on Engineer's authority and responsibility set forth in this Article VII and particularly, but without limitation, during or as a result of Engineer's on-site visits or observations of Contractor's Work, Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with federal, State and local Laws, rules, and regulations applicable to the furnishing or performance of the Work.

7.4 CLARIFICATIONS AND INTERPRETATIONS. Engineer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as Engineer may determine necessary, which shall be consistent with the intent of and reasonably inferable from the Contract Documents. Such written clarifications and interpretations will be binding on SWACO and Contractor. If SWACO or Contractor believes that a written clarification or interpretation justifies an adjustment to the Contract Price or Contract Times, or both, and the parties are unable to agree to the amount or extent thereof, if any, SWACO or Contractor may make a written claim therefor pursuant to the terms as provided herein.

7.5 AUTHORIZED VARIATIONS IN THE WORK. Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on SWACO and Contractor, who shall perform the Work involved promptly. If SWACO or Contractor believes that a Field Order justifies an adjustment in the Contract Price or Contract Times, and the parties are unable to agree as to the amount or extent thereof, SWACO or Contractor may make a written claim pursuant to the terms as provided herein.

7.6 REJECTING DEFECTIVE WORK. Engineer will have authority to disapprove or reject Work, which Engineer believes to be defective, or Project Engineer believes will not produce a completed Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Engineer shall also have the authority to require special inspection or testing of the Work as provided herein, whether or not the Work is fabricated, installed, or completed.

7.7 DETERMINATIONS FOR UNIT PRICES. Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Engineer will review with Contractor the Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Engineer's written decision thereon will be final and binding, except as modified by Project Engineer to reflect changed factual conditions or more accurate data, upon SWACO and Contractor, subject to the provisions of the Dispute Resolution Procedures of these General Conditions or as otherwise agreed.

7.8 Engineer will be the interpreter of the requirements of the Contract Documents and shall determine the acceptability of the Work in relation to the requirements of the Contract Documents. Claims, disputes, and other matters relating to the performance, furnishing, or acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents

pertaining to whether the performance of the Work is in accordance with the Contract Documents, and claims seeking changes in the Contract Price or Contract Times will be referred initially to the Project Engineer in accordance with the terms of these General Conditions.

7.8.1 When functioning as interpreter under paragraph 7.8, Engineer will not show partiality to the positions taken by SWACO or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. To the extent provided by the General Conditions, the rendering of a decision by Engineer with respect to any claim, dispute or other matter relating to the performance, furnishing, or acceptability of the Work, the quantities and classifications of Unit Price Work, the interpretation of the requirements of the Contract Documents pertaining to performance of the Work, and claims seeking changes in the Contract Price or Contract Times (except any which have been waived by the making or acceptance of final payment), will be a condition precedent to any exercise by SWACO or Contractor of such rights or remedies as either may otherwise have under the Contract Documents or by any such Laws or Regulation regarding any such claim or dispute.

7.8.2 Notwithstanding any other provision set forth in the Contract Documents, no interpretation, decision, or recommendation of Engineer which results in a Change Order due to a change in Contract Price or other change in the Contract Documents which SWACO's Executive Director, at his sole and complete discretion, determines requires the issuance of a Change Order, shall be binding upon SWACO unless and until such Change Order has been approved by SWACO's Board of Trustees in accordance with SWACO's by-laws, rules, and/or procurement policy.

7.9 Neither Engineer's authority or responsibility under any provision of the Contract Documents, nor any decision made by Engineer in good faith, shall create, impose, or give rise to any duty owed by Engineer to Contractor, any Subcontractor, any Supplier, any other person or organization other than SWACO, or to any surety for, or employee or agent of any of them.

7.10 Engineer will not supervise, direct, control, or have authority over or be responsible for Contractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with pertinent provisions of federal, State and local laws, rules and regulations applicable to the furnishing or performance of the Work. Engineer shall not be responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents, or for any acts or omissions of Contractor or of any Subcontractor, Supplier, or any other person or organization performing or furnishing any of the Work.

7.11 Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, tests and approvals, and any other documentation required to be delivered by these General Conditions will only be to determine generally that their content complies with the requirements of, and in the case of certificates of inspections, tests, and approvals, that the results certified indicate compliance with the Contract Documents.

ARTICLE VIII CHANGES IN THE WORK

8.1 CHANGE ORDER

8.1.1 Without invalidating the Agreement and without notice to any surety, SWACO may, at any time or from time to time, order additions, deletions, or revisions in the Work. Such additions, deletions, or revisions will be authorized by Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents, except as otherwise specifically provided.

8.1.1(a) If SWACO and Contractor are unable to agree as to the extent, if any, of an adjustment in the Contract Price or Contract Times that should be allowed under a Work Change Directive, a claim may be made therefor as provided herein.

8.1.2 Except in the case of emergency or a required uncovering of the Work, Contractor shall not be entitled to an increase in Contract Price or an extension of Contract Times without a Written Amendment, a Change Order, or a Work Change Directive. Contractor shall not be entitled to rely upon any alleged course of conduct or verbal instructions as a basis for a change in the Contract Price or Contract Time. If Contractor proceeds with purportedly extra Work without Written Amendment, a Change Order, or a Work Change Directive it does so at its own risk.

8.1.3 SWACO and Contractor shall execute appropriate Change Orders recommended by Engineer, or Written Amendments covering:

8.1.3(a) changes in the Work which are (i) ordered by SWACO pursuant to paragraph 8.1.1, (ii) required because of acceptance of defective Work or correcting defective Work under the terms herein, or (iii) agreed to by the parties;

8.1.3(b) changes in the Contract Price or Contract Times which are agreed to by the parties;

8.1.3(c) changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Engineer pursuant to paragraph 7.8;

Provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the progress schedule as provided herein.

8.1.4 If any notice of any change affecting the general scope of the Work or the provisions of the Contract Documents, including, but not limited to, Contract Price or Contract Times, is required by the provisions of any Bond to be given to a surety, the giving of such notice shall be Contractor's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE IX CHANGE OF CONTRACT PRICE

9.1 The Contract Price represents the entire and total compensation, subject to authorized adjustments, payable to Contractor for performing the Work. All duties, responsibilities, and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change in the Contract Price.

9.2 The Contract Price may only be changed by a Change Order or by Written Amendment. Any claim for adjustment in Contract Price shall be based on written notice delivered by the party making the claim to the other party and Engineer promptly, but in no event later than thirty (30) days, after the start of the occurrence or event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty (60) days after the start of such occurrence or event, and shall be accompanied by claimant's written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or event. All claims for adjustment in Contract Price shall be determined by Engineer if SWACO and Contractor cannot otherwise agree on the amount involved. No claim for adjustment of the Contract price will be valid if not submitted in accordance with this paragraph.

9.3 The value of any Work covered by a Change Order or of any claim for an adjustment in the Contract Price will be determined as follows:

9.3.1 Where the Work involved is covered by Unit Prices set forth in the Contract Documents, by application of such Unit Prices to the quantities of the Work involved, subject to the provisions governing Unit Price Work;

9.3.2 Where the Work involved is not covered by Unit Prices set forth in the Contract Documents, by a mutually agreed lump sum;

9.3.3 Where the Work involved is not covered by Unit Prices set forth in the Contract Documents and agreement to a lump sum is not reached, on the basis of the Cost of the Work as determined pursuant to the provisions herein.

9.4 Cost of the Work. The term Cost of the Work means the sum of all costs necessarily incurred and paid by Contractor in the proper performance of the Work. Except as otherwise may be agreed to in writing by SWACO, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 9.5:

9.4.1 Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by SWACO and Contractor. Such employees shall include superintendents, foremen, and other personnel employed full-time at the site. Payroll costs for employees not employed full-time on the Work shall be apportioned on the basis of their time spent on the Work. The expense of performing Work after regular working hours, on Saturdays, Sundays, or legal holidays shall be included in the above to the extent authorized by SWACO.

9.4.2 Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All trade discounts, rebates, refunds, returns from sale of surplus materials and equipment shall accrue to SWACO, and Contractor shall make provisions so that they may be obtained.

9.4.3 Payments made by Contractor to Subcontractors for Work performed or furnished by Subcontractors. If required by SWACO, Contractor shall obtain competitive bids from subcontractors acceptable to SWACO and Contractor, and shall deliver such bids to SWACO who will then determine, with the advice of Engineer, which bids, if any, will be accepted.

9.4.4 Costs of special consultants, including but not limited to engineers, architects, testing laboratories, surveyors, attorneys, and accountants, employed for services specifically related to the Work.

9.4.5 Supplemental costs including the following:

9.4.5(a) The proportion of necessary transportation, travel, and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work;

9.4.5(b) Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office, and temporary facilities at the site and hand tools not owned by the workers which are consumed in the performance of the Work;

9.4.5(c) Rentals of all construction equipment and machinery and parts thereof whether rented from Contractor or others in accordance with rental agreements approved by SWACO with the advice of Engineer, as well as the costs of transportation, loading, unloading, installation, dismantling, and removal thereof. The rental of any such equipment shall cease when the use thereof is no longer necessary for the Work.

9.4.5(d) Sales, consumer, use, or similar taxes related to the Work, and for which Contractor is liable, as imposed by laws and Regulations;

9.4.5(e) Deposits lost for causes other than negligence of Contractor, and Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable;

9.4.5(f) Losses and damages caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance and furnishing of the Work, provided they have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts of any of them may be liable;

9.4.5(g) The costs of utilities, fuel, and sanitary facilities at the site;

9.4.5(h) Minor expenses such as telephone service at the site, expressage, and similar petty cash items in connection with the Work;

9.4.5(i) Costs of premiums for additional Bonds and insurance required because of changes in the Work.

9.5 The term Cost of the Work shall not include any of the following:

9.5.1 Payroll costs and other compensation of Contractor's officers, executives, principals, general managers, engineers, architects, estimators, attorneys, auditors, accountants, and other personnel employed by Contractor whether at the site or in Contractor's principal or branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications;

9.5.2 Expenses of Contractor's principal and branch offices other than Contractor's office at the site;

9.5.3 Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments;

9.5.4 Cost of premiums for all Bonds and for all insurance whether or not Contractor is required by the Contract Documents to purchase and maintain the same;

9.5.5 Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials, equipment wrongly supplied, and making good any damage to property;

9.5.6 Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 8.4.

9.6 Whenever the Cost of Work is to be determined pursuant to paragraphs 9.4 and 9.5, Contractor shall establish and maintain records thereof in accordance with generally accepted accounting practices and submit in form acceptable to Engineer an itemized cost breakdown together with supporting data.

9.7 It is understood that Contractor has included in the Contract price all allowances so named in the Contract Documents and shall cause the Work so covered to be furnished and performed for such sums as may be acceptable to SWACO and Engineer. Contractor agrees that:

9.7.1 the allowances include the cost to Contractor, less any applicable trade discounts, of materials and equipment required by the allowances to be delivered at the site, and all applicable taxes; and

9.7.2 Contractor's costs for unloading and handling on site, labor, installation costs, overhead, profit, and other expenses contemplated for the allowances have been included in the Contract Price and not in the allowances and no demands for additional payment on account of any of the foregoing will be valid.

Prior to final payment, an appropriate Change Order will be issued as recommended by Engineer to reflect actual amounts due Contractor on account of Work covered by allowances, and the Contract Price shall be accordingly adjusted.

9.8 Unit Price Work. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Engineer in accordance with the provisions as contained herein.

9.8.1 Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

9.8.2 SWACO or Contractor may make a claim for an adjustment in the Contract Price in accordance with this Article if:

9.8.2(a) the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

9.8.2(b) there is no corresponding adjustment with respect to any other item of Work; and

9.8.2(c) if Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE X CHANGE OF CONTRACT TIMES

10.1 The Contract Times (or Milestones) may only be changed by a Change Order or Written Amendment. Any claim for adjustment of the Contract Times (or Milestones) shall be based on written notice delivered by the party making the claim to the other party and to Engineer promptly, but in no event later than thirty (30) days after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting documentation shall be delivered within sixty (60) days after such occurrence, and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which claimant has reason to believe it is entitled as a result of the occurrence or event. All claims for adjustments in the Contract Times (or Milestones) shall be determined by Engineer in accordance with the provisions as contained herein if SWACO and Contractor cannot agree. No claim for an adjustment in the Contract Times (or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph.

10.2 All time limits stated in the Contract Documents are of the essence of the Agreement.

10.3 Where Contractor is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of the Contractor, the Contract Times (or Milestones) will be extended an amount equal to the time lost due to such delay if a claim is made thereunder as provided in paragraph 10.1. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by SWACO, acts or neglect of utility owners or other contractors performing other work as contemplated herein, fires, floods, epidemics, abnormal weather conditions, or acts of God. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

10.4 Where Contractor is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of both SWACO and Contractor, an extension of the Contract Times (or Milestones) in an amount equal to the time lost due to such delay shall be Contractor's sole and exclusive remedy for such delay. In no event shall SWACO be liable to Contractor, any Subcontractor, Supplier, or any other person or organization, or to any surety for or employee or agent of any of them, for damages arising out of or resulting from (i) delays caused by or within the control of Contractor, or (ii) delays beyond the control of both parties including but not limited to fires, floods, epidemics, abnormal weather conditions, acts of God, or acts or neglect by utility owners or other contractors performing other work.

ARTICLE XI
TESTS AND INSPECTIONS; CORRECTION, REMOVAL,
OR ACCEPTANCE OF DEFECTIVE WORK

11.1 NOTICE OF DEFECTS. Prompt notice of all defective Work of which SWACO or Engineer have actual knowledge will be given to Contractor. All defective Work may be rejected, corrected, or accepted as provided in this Article.

11.2 ACCESS TO WORK. SWACO, Engineer, Engineer's Consultants, other representatives and personnel of SWACO, independent testing laboratories, and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their inspection, observation, and testing. Contractor shall provide them with proper and safe conditions for such access and advise of Contractor's site safety procedures and programs so that they may comply therewith.

11.3 TESTS AND INSPECTIONS. Contractor shall give engineer timely notice of readiness of the work for all required inspections, tests, or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

11.4 SWACO shall employ and pay for the services of an independent testing laboratory to perform all inspections, tests, or approvals required by the contract documents except:

11.4.1 inspections, tests, or approvals covered by paragraph 11.5 below;

11.4.2 costs incurred in connection with tests or inspections conducted pursuant to paragraph 11.9 below shall be paid as provided in that paragraph; and

11.4.3 as otherwise specifically provided in the Contract Documents.

11.5 If Laws or Regulations of any public body having jurisdiction require any Work (or any part thereof) specifically to be inspected, tested, or approved, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests, or approvals, pay all costs in connection therewith, and furnish Engineer the required certificates of inspection or approval. Contractor shall also be responsible for arranging and obtaining, and shall pay all costs in connection with, any inspections, tests, or approvals required for SWACO's and Engineer's acceptance of materials or equipment to be incorporated within the Work, or of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work.

11.6 If any Work or the work of others that is to be inspected, tested, or approved is covered by Contractor without written concurrence of Engineer, it must, if requested by Engineer, be uncovered for observation.

11.7 Uncovering Work as provided in 11.8 shall be at Contractor's expenses unless Contractor has given engineer timely notice of Contractor's intent to cover same and Engineer has not acted with reasonable promptness in response to such notice.

11.8 UNCOVERING THE WORK. If any Work is covered contrary to the written request of Engineer, it must, if requested by Engineer, be uncovered for Engineer's observation and replaced at Contractor's expense.

11.8.1 If Engineer considers it necessary or advisable that covered Work be observed by Engineer or inspected or tested by others, Contractor, at Engineer's request, shall uncover, expose, or otherwise make available for observation, inspection, or testing as Engineer may require, that portion of the Work in question, furnishing all necessary labor, materials, and equipment.

11.8.1(a) If it is found that such Work is defective, Contractor shall pay all claims, costs, losses, and damages caused by, arising out of, or resulting from such uncovering, exposure, observation, inspection and testing, and of the satisfactory replacement or reconstruction, including but not limited to all costs of repair or replacement of the work of others. SWACO shall thus be entitled

to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim as provided for herein.

11.8.1(b) If such Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, testing, inspection, replacement, and reconstruction. If the parties are unable to agree as to the amount or extent thereof, Contractor may make a claim therefor as provided herein.

11.9 OWNER MAY STOP THE WORK. If the Work is defective, or Contractor fails to supply sufficient skilled workers, suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, SWACO may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of SWACO to stop the Work shall not give rise to any duty on the part of SWACO to exercise this right for the benefit of Contractor or any surety or other party.

11.10 CORRECTION OR REMOVAL OF DEFECTIVE WORK. If required by Engineer, Contractor shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed, or completed, or if the Work has been rejected by Engineer, remove it from the Site and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses, and damages caused by or resulting from such correction or removal, including but not limited to all costs of repair or replacement of the work of others.

11.11 CORRECTION PERIOD. If within one (1) year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or regulations, or by the terms of any applicable special guarantee required by the Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to SWACO and in accordance with SWACO's written instructions:

11.11.1 correct such defective Work or, if it has been rejected by SWACO, remove it from the Site and replace it with Work that is not defective, and

11.11.2 satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom.

If Contractor does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk of loss or damage, SWACO may have the defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses, and damages caused by or resulting from such removal and replacement shall be paid by Contractor.

11.12 Where defective Work, and damage to other Work resulting therefrom, has been corrected, removed, or replaced under paragraph 11.11, the correction period hereunder with respect to such Work will be extended for an additional period of one (1) year after such correction, removal, or replacement has been satisfactorily completed.

11.13 ACCEPTANCE OF DEFECTIVE WORK. If, instead of requiring the correction or removal and replacement of defective Work, SWACO prefers to accept it, SWACO may do so. Contractor shall pay all claims, costs, losses, and damage attributable to SWACO's evaluation of and determination to accept such defective Work. If any such acceptance occurs prior to Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work. SWACO shall further be entitled to an appropriate decrease in the Contract Price, and if the parties are unable to agree as to the amount thereof, SWACO may make a claim as provided herein. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to SWACO.

11.14. SWACO MAY CORRECT THE DEFECTIVE WORK. If Contractor fails within a reasonable time or after written notice from Engineer to correct defective Work or to remove and replace rejected Work as required by Engineer, or if Contractor fails to comply with any provisions of the Contract Documents, SWACO may, after seven (7) days written notice to Contractor, correct and remedy any such deficiency.

In exercising the rights and remedies under this paragraph, SWACO shall proceed expeditiously. In connection with such corrective and remedial action, SWACO may exclude Contractor from all or part of the Site, take possession of all or part of the Work, and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which SWACO has paid Contractor but which are stored elsewhere.

11.14.1 Contractor shall allow SWACO, SWACO's representatives, agents, and employees, SWACO's other contractors, Engineer, and Engineer's consultants access to the site to enable SWACO to exercise the rights and remedies under this paragraph. All claims, costs, losses, and damages incurred or sustained by SWACO in exercising such rights and remedies will be charged against Contractor and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work, and SWACO shall be entitled to an appropriate decrease in the Contract Price. Such claims, costs, losses, and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal, or replacement of Contractor's defective Work. Contractor shall not be allowed an extension of the Contract Times because of any delay in the performance of the Work attributable to the exercise of SWACO of SWACO's rights and remedies hereunder.

ARTICLE XII PAYMENTS TO COMPLETION

12.1 SCHEDULE OF VALUES. The schedule of values established as provided herein will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

12.2 APPLICATION FOR PROGRESS PAYMENTS. At least twenty (20) days before the date established for each progress payment, but not more than one a month, Contractor shall submit to Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice, or other documentation warranting that SWACO has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect SWACO's interest therein, all of which will be satisfactory to SWACO.

12.3 CONTRACTOR'S WARRANTY OF TITLE. Contractor warrants and guarantees that title to all Work, materials, and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to SWACO no later than the time of payment free and clear of all Liens.

12.4 REVIEW OF APPLICATIONS FOR PROGRESS PAYMENT. Engineer will, within ten (10) days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to SWACO, or return the Application to Contractor indicating in writing Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application. Ten (10) days after the presentation of the Application of Payment to SWACO with Engineer's recommendation, the amount recommended will become due and when due will be paid by SWACO to Contractor.

12.5 Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Engineer to SWACO, based on Engineer's on-site observations of the executed Work as an experienced and qualified design professional and on Engineer's review of the

Application for Payment and the accompanying data and schedules, that to the best of Engineer's knowledge, information, and belief:

12.5.1 the Work has progressed to the point indicated,

12.5.2 the quality of the Work is generally in accordance with the Contract Documents, subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work, and to any other qualifications stated in the recommendation, and

12.5.3 the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled insofar as it is Engineer's responsibility to observe the Work. However, by recommending any such payment, Engineer will not thereby be deemed to have represented that:

(i) exhaustive or continuous on-site inspections have been made to check the quality or quantity of Work beyond the responsibilities specifically assigned Engineer in the Contract Documents, or

(ii) that there may not be other matters or issues between the parties that might entitle SWACO to withhold payment from Contractor or entitle Contractor to additional payment by SWACO.

12.6 Engineer's Recommendation of any payment, including final payment, shall not mean that Engineer is responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the furnishing or performance of Work, or for any failure of Contractor to perform or furnish Work in accordance with the Contract Documents.

12.7 Engineer may refuse to recommend the whole or any part of any payment if, in Engineer's opinion, it would be incorrect to make the representation to SWACO referred to in paragraph 12.5. Engineer may also refuse to recommend any such payment, or because of subsequently discovered evidence of the results of inspections or tests, nullify any payment previously recommended, to such extent as may be necessary in Engineer's opinion to protect SWACO from loss due to any of the following:

12.7.1 the Work is defective, or completed Work has been damaged requiring correction or replacement,

12.7.2 the Contract Price has been reduced by Written Amendment or Change Order,

12.7.3 SWACO has been required to correct defective Work or complete Work in accordance with paragraph 11.14, or

12.7.4 Engineer has actual knowledge of the occurrence of any of the events enumerated in paragraphs 13.2.1 through 13.2.4 inclusive.

SWACO may refuse to make payment of the full amount recommended by Engineer because:

12.7.5 Claims have been made against SWACO on account of Contractor's performance or furnishing of the Work,

12.7.6 Liens have been filed in connection with the Work, except where Contractor has delivered a specific Bond satisfactory to SWACO to secure the satisfaction and discharge of such Liens,

12.7.7 There are other items entitling SWACO to a set-off against the amount recommended, or

12.7.8 SWACO has actual knowledge of the occurrence of any of the events enumerated in paragraphs 12.7.1 through 12.7.3 or paragraphs 13.2.1 through 13.2.4 inclusive;

But SWACO must give Contractor immediate written notice, with a copy to Engineer, stating the reasons for such action and promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by SWACO and Contractor, when Contractor corrects to SWACO's satisfaction the reasons for such action.

12.8 SUBSTANTIAL COMPLETION. When Contractor considers the entire Work ready for its intended use, Contractor shall notify SWACO and Engineer in writing that the entire Work is substantially complete, except for those items specifically listed by Contractor as incomplete, and request Engineer issue a certificate of Substantial Completion. Within a reasonable time thereafter, but in no event later than seven (7) days thereafter, SWACO, Contractor, and Engineer shall make an inspection of the Work to determine the status of completion.

12.8.1 If Engineer does not consider the Work substantially complete, Engineer shall notify Contractor in writing giving the reasons therefor.

12.8.2 If Engineer considers the Work substantially complete, Engineer shall prepare and deliver to SWACO a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. Attached to the certificate shall be a tentative list of items to be completed or corrected before final payment.

12.8.3 SWACO shall have seven (7) days after the receipt of the tentative certificate during which to make written objection to Engineer as to any of the provisions of the certificate or attached list. If, after considering such objections, Engineer concludes that the Work is not substantially complete, Engineer will within fourteen (14) days after submission of the tentative certificate to SWACO notify Contractor in writing, stating the reasons therefor.

12.8.4 If, after consideration of SWACO's objections, Engineer considers the Work substantially complete, Engineer will within said fourteen (14) days execute and deliver to SWACO and Contractor a definitive certificate of Substantial Completion, with a revised list of tentative list of items to be completed or corrected, reflecting such changes from the tentative certificate as Engineer believes justified after consideration of any objections from SWACO.

12.8.5 At the time of delivery of the tentative certificate of Substantial Completion, Engineer shall deliver to SWACO and Contractor a written recommendation as to division of responsibilities pending final payment between SWACO and Contractor with respect to security, operation, safety, maintenance, heat, utilities, insurance, and warranties and guarantees. Unless SWACO and Contractor agree otherwise in writing and so inform Engineer in writing prior to Engineer's issuance of the definitive certificate of Substantial Completion, Engineer's aforesaid recommendation will be binding on SWACO and Contractor until final payment.

12.9 SWACO shall have the right to exclude Contractor from the Work after the date of Substantial Completion, but SWACO shall allow Contractor reasonable access to complete or correct items on the tentative list.

12.10. PARTIAL UTILIZATION. Use by SWACO at SWACO's option of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) SWACO, Engineer, and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by SWACO for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

12.10.1 SWACO may at any time request in writing that Contractor permit SWACO to use any such part of the Work which SWACO believes to be ready for its intended use and substantially complete. If Contractor agrees that such part of the Work is substantially complete, Contractor shall certify to SWACO and Engineer that such part of the Work is substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work. Contractor may at any time notify SWACO and Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Engineer to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, but in no event later than seven (7) days, SWACO, Contractor, and Engineer shall make an inspection of that part of the Work to determine its status of completion. If Engineer does not consider that part of the

Work to be substantially complete, Engineer shall notify SWACO and Contractor in writing and give the reasons therefor. If Engineer considers that part of the Work to be substantially complete, the provisions of paragraphs 12.8 and 12.9 shall apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

12.10.2 No occupancy or separate operation of part of the Work shall be accomplished prior to compliance with the requirements of the paragraph herein as related to property insurance.

12.11 FINAL INSPECTION. Upon written notice from Contractor that the entire Work or agreed upon portion thereof is complete, Engineer shall make a final inspection with SWACO and Contractor and shall notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

12.12 FINAL APPLICATION FOR PAYMENT. After Contractor has completed all such corrections to the satisfaction of Engineer and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance as required, certificates of inspection, marked-up record documents, and other documents, Contractor may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied, except as previously delivered, by:

12.12.1 all documentation called for in the Contract Documents, including but not limited to the evidence of insurance as required by the Agreement herein,

12.12.2 consent of the surety, if any, to final payment, and

12.12.3 complete and legally effective releases or waivers which are satisfactory to SWACO of all Liens arising out of or filed in connection with the Work. In lieu of such releases or waivers of Liens and as approved by SWACO, Contractor may furnish receipts or releases in full and an affidavit of Contractor that:

(a) the releases and receipts include all labor, services, materials, and equipment for which a Lien could be filed, and

(b) all payrolls, material, and equipment bills and other indebtedness connected with the Work for which SWACO or SWACO's property might in any way be responsible have been paid or otherwise satisfied.

If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to SWACO to indemnify SWACO against any Lien.

12.13 FINAL PAYMENT AND ACCEPTANCE. If, on the basis of Engineer's observation of the Work during construction and final inspection, and Engineer's review of the final Application for Payment and accompanying documentation as required by the Contract Documents, Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Engineer shall, within ten (10) days of receipt of the final Application for Payment, indicate in writing Engineer's recommendation of payment and present the Application to SWACO for payment. Concurrently, Engineer shall also give written notice to SWACO and Contractor that the Work is acceptable subject to the provisions of paragraph 12.15. Otherwise, Engineer shall return the Application for Payment to Contractor, indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application.

12.13.1 Thirty (30) days after the presentation to SWACO of the Application and accompanying documentation, in appropriate form and substance and with Engineer's recommendation and notice of acceptability, the amount recommended by Engineer shall become due and will be paid by SWACO to Contractor.

12.14 If, through no fault of Contractor, final completion of the Work is significantly delayed and Engineer so confirms, SWACO shall, upon receipt of Contractor's final Application for Payment and recommendation of Engineer, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by SWACO for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required herein, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

12.15 WAIVER OF CLAIMS. The making and acceptance of final payment shall constitute:

12.15.1 a waiver of all claims by SWACO against Contractor, except claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 12.11, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents, and

12.15.2 a waiver of all claims by Contractor against SWACO other than those previously made in writing and still unsettled.

ARTICLE XIII SUSPENSION OF WORK AND TERMINATION

13.1 SWACO MAY SUSPEND THE WORK. At any time and without cause, SWACO may suspend the Work or any portion thereof for a period of not more than ninety (90) days by notice in writing to Contractor and Engineer which will fix the date on which the work shall be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes an approved claim therefor as provided in Articles IX and X.

13.2 SWACO MAY TERMINATE. Upon the occurrence of any one or more of the following events:

13.2.1 if Contractor persistently fails to perform the work in accordance with the Contract Documents, including but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment, or failure to adhere to the progress schedule established as adjusted from time to time pursuant to the provisions as contained herein;

13.2.2 if Contractor disregards Laws or Regulations of any public body having jurisdiction;

13.2.3 if Contractor disregards the authority of Engineer, or

13.2.4 if Contractor otherwise violates in any substantial way any provisions of the Contract Documents,

SWACO may, after giving Contractor (and the surety, if any) seven (7) days written notice and to the extent permitted by Laws and Regulations, terminate the services of Contractor, exclude Contractor from the site and take possession of the Work and all of Contractor's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by Contractor, without liability to Contractor for trespass or conversion, incorporate into the Work all materials and equipment stored at the site or for which SWACO has paid Contractor but which are stored elsewhere, and finish the Work as SWACO may deem expedient. In such case, Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses, and damage sustained by SWACO arising out of or resulting from completing the Work, such excess shall be paid to Contractor. If such claims, losses, costs, and damages exceed such unpaid balance, Contractor shall pay the difference to SWACO. Such claims, costs, losses, and damages incurred by SWACO shall be reviewed by Engineer as to their

reasonableness and when so approved by Engineer, shall be incorporated into a Change Order, provided that when exercising any rights or remedies under this paragraph SWACO shall not be required to obtain the lowest price for the Work performed.

13.2.5 Should a tribunal find that any termination by SWACO under Paragraph 13.2 was improper, then the termination shall be treated as if it were a termination under Paragraph 13.4, below.

13.3 Where Contractor's services have been so terminated by SWACO, the termination shall not affect any rights or remedies of SWACO against Contractor then existing or which may thereafter accrue. Any retention or payment of monies due Contractor by SWACO will not release Contractor from liability.

13.4 Upon seven (7) days' written notice to Contractor and Engineer, SWACO may, without cause and without prejudice to any other right or remedy of SWACO, elect to terminate the Agreement. In such case, Contractor shall be paid, without duplication of any items:

13.4.1 for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

13.4.2 for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials, or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

13.4.3 for all claims, costs, losses, and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers, and others;

13.4.4 for reasonable expenses directly attributable to termination.

Contractor shall not be paid on account of loss of anticipated profits, revenue, or other economic loss arising out of or resulting from such termination.

13.5 CONTRACTOR MAY STOP WORK OR TERMINATE. If, through no act or fault of Contractor, the Work is suspended for a period of more than ninety (90) days by SWACO or under a court order or that by any other public authority, or Engineer fails to act on any Application for Payment within thirty (30) days after it is submitted, or SWACO fails for thirty (30) days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven (7) days written notice to SWACO and Engineer, and provided SWACO or Engineer do not remedy such suspension or failure within that time, terminate the Agreement and recover from SWACO payment on the same terms as provided in paragraph 13.4.

13.5.1 In lieu of terminating the Agreement and without prejudice to any other right or remedy, if Engineer has failed to act on any Application for Payment within thirty (30) days after it is submitted, or SWACO has failed for thirty (30) days to pay Contractor for any sum finally determined to be due, Contractor may, upon seven (7) days' written notice to SWACO and Engineer, stop the Work until payment of all such amounts due Contractor. The provisions of this paragraph are not intended to preclude Contractor from making a claim under Articles IX and X for an increase in Contract Price or Contract Times, or otherwise for expenses or damage directly attributable to Contractor's stopping Work as permitted by this paragraph.

ARTICLE XIV DISPUTE RESOLUTION

14.1 If and to the extent that SWACO and Contractor have agreed on the method and procedure for resolving disputes between them that may arise under this Agreement, such dispute resolution method and procedure, if any, shall be set forth herein as an Exhibit or otherwise stated in the Contract Documents. If no such Agreement has been reached, and subject to the other provisions as contained within this Agreement, SWACO and Contractor may exercise such rights or remedies as either may otherwise have under the Contract Documents or by the applicable Laws or Regulations relating to any dispute.

ARTICLE XV AUDITS AND RECORDS EXAMINATION

15.1 SWACO shall have the right to examine all books, records, documents and other data of the Contractor and of the Contractor's Subcontractors and Suppliers related to the bidding, pricing or performance of the Work for any purpose.

15.2 Contractor, Subcontractor, or Supplier, as applicable, shall retain such records and make them available at all reasonable times for inspection, audit and reproduction until the expiration of five (5) years after the date of acceptance of the Project by SWACO.

15.3 To the extent permitted by Ohio Revised Code Section 149.43, and to the extent that the Contractor, Subcontractors, or Suppliers, as applicable, inform SWACO in writing that any documents copied by SWACO are trade secrets, SWACO shall treat such documents as trade secrets of the Contractor, Subcontractors, or Suppliers.

15.3.1 In the event any dispute arises with any other person about whether such other person should be given access to the documents, Contractor, Subcontractors, or Suppliers, as applicable, agree to indemnify SWACO against all costs, expenses, and damages, including without limitation attorneys' fees, incurred by reason of that dispute.

15.4 The right of inspection, audit, and reproduction shall extend to all documents necessary to permit adequate evaluation of the cost of pricing data submitted along with the computations and projections used therein.

15.5 Records which relate to disputes, litigation, or settlement of claims arising out of the performance of the Work shall be made available to SWACO until such dispute, litigation, or claims have been finally decided or settled.

15.6 If the Agreement has been terminated, in whole or in part, the records relating to the Work terminated shall be made available to SWACO for a period of five (5) years from the date of any applicable final settlement.

ARTICLE XVI PREVAILING WAGE PAYROLL SUBMITTALS

16.1 PAYROLL SCHEDULE. Within ten (10) days from the date of the Notice to Proceed, Contractor shall provide SWACO's prevailing wage coordinator with a schedule of dates during the term of the Contract on which wages will be paid to employees for the Project.

16.2 PAYROLL REPORTS

16.2.1 Contractor shall submit payroll reports with each Application for Payment, which reports shall be certified by Contractor that the payroll is correct and complete and the wage rates shown are not less than those required by the Agreement. Contractor shall be responsible for submitting all payroll reports of the Contractor's Subcontractors.

16.2.1(a) Each payroll report shall indicate the period covered and shall include a list containing the name, and address of each employee of Contractor and Contractor's Subcontractors paid for the Work.

16.2.1(b) Each payroll report shall list the number of hours each employee worked each day on the Project during the reporting period, the total hours worked by each employee during each week on the Project, the employee's hourly rate of pay, the employee's job classification, the employee's fringe benefits and all deductions from the employee's wages and net pay. The payroll report shall also list each fringe benefit and state if it is paid as cash to the employee or to a named plan.

16.2.1(c) Contractor and Subcontractors shall also submit apprenticeship agreements for all apprentices utilized on the Project.

16.3 AFFIDAVIT. Before any final payment of funds is made to Contractor, Contractor shall file with SWACO the Affidavit required by Ohio Revised Code Section 4115.07.

ARTICLE XVII MISCELLANEOUS

17.1 GIVING NOTICE. Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual, or to a member of the firm or an officer of the corporation for whom it is intended, or if delivered or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

17.2 COMPUTATION OF TIME. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include last day of such period. If the last day of any such period falls on a Saturday, Sunday, or a day made a legal holiday by the law of applicable jurisdiction, such day shall be omitted from the computation.

17.2.1 A calendar day of twenty-four (24) hours measured from midnight to the next midnight shall constitute a day.

17.3 NOTICE OF CLAIM. Should SWACO or Contractor suffer injury or damage to person or property because of any error, act, or omission of the other party, or of any of the other party's employees, agents, or others whose acts the other party is legally liable, claim will be made in writing to the other party within a reasonable amount of time of the first observance of such injury or damage. The provisions of this paragraph 17.3 shall not be construed as a substitute for or a waiver of the provision of any applicable statute of limitations or repose.

17.4 CUMULATIVE REMEDIES. The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and in particular but without limitation, the warranties, guarantees, and obligations imposed upon Contractor, and all of the rights and remedies available to SWACO and Engineer thereunder, are in addition to, and are not construed in any way as a limitation of, any rights and remedies available to any or all parties which are otherwise imposed or applicable pursuant to Laws and Regulations, by special warranty, guarantee, or other provision of the Contract Documents, and the provision of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right, and remedy to which they apply.

17.5 ROYALTIES AND PATENTS

17.5.1 Contractor shall pay all royalties, license fees, and assume all costs incident to the use and/or in the performance of the Work or the incorporation in the Work of any invention, design, process, product, or device which is the subject of patent rights or copyrights held by others.

17.5.2 If Contractor has reason to believe that use of the specified item is subject to patent or copyright protection, Contractor shall immediately notify SWACO.

17.6 ASSIGNMENT OF ANTITRUST CLAIMS. By executing the Agreement, Contractor assigns, conveys, and transfers to SWACO any right, title, and interest to any claims or causes of action it may have or acquire under state or federal antitrust laws relating to any goods, products, or services purchased, procured or rendered to SWACO pursuant to the contract.

17.7 PROJECT IDENTIFICATION SIGN

17.7.1 Unless otherwise specified in the Contract Documents, Contractor shall furnish and erect a Project identification sign within thirty (30) Days from the date of the Notice to Proceed.

17.7.2 The sign shall be maintained in good condition until the completion of the Project at which time it shall be removed by the entity providing same.

17.7.3 Any cost associated with moving or repairing the Project identification sign during the progress of the Project shall be the responsibility of the entity providing same.

17.8 SALES, USE, EXCISE AND PROPERTY TAX. SWACO is exempt from any sales, use, excise and property tax. To the extent sales, use, excise, or any similar tax is imposed on the Contractor in connection with these general Conditions, such will be the sole and exclusive responsibility of the Contractor, and the Contractor will pay such taxes (together with any interest and penalties not disputed with the appropriate taxing authority) whether they are imposed at the time the services are rendered or a later time.

17.9 PROFESSIONAL FEES AND COSTS INCLUDED. Whenever reference is made to “claims, costs, losses, and damages”, it shall include in each case, but not limited to, all fees and charges of engineers, architects, attorneys, and other professionals, and all court, arbitration, or other dispute resolution costs.

17.10 SURVIVAL OF OBLIGATIONS. All representations, indemnifications, warranties, and guarantees made in, required by or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Contract.

Exhibit E

007. MRTS Improvements Project Specifications

Project Manual for the Morse Road Transfer Station Improvements

March 3, 2025
Volumes 1 and 2

PROJECT MANUAL
MORSE ROAD TRANSFER STATION IMPROVEMENTS



SOLID WASTE AUTHORITY OF CENTRAL OHIO
COLUMBUS, OHIO
CONSTRUCTION DOCUMENTS

March 3, 2025
Volume 1 of 2

By:

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STRUCTURE DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolishing designated structures.
2. Demolishing designated foundations.
3. Demolishing designated slabs-on-grade.
4. Demolishing, disconnecting and capping designated utilities.
5. Demolishing designated underground tanks.
6. Removing designated items for reuse and Owner's retention.
7. Protecting items designated to remain.
8. Removing demolished materials.

B. Related Sections:

1. Section 31 05 13 - Soils for Earthwork: Backfill materials.
2. Section 31 05 16 - Aggregates for Earthwork: Backfill materials.
3. Section 31 10 00 - Site Clearing: Clearing outside periphery of structures.
4. Section 31 23 23 - Fill.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Indicate demolition and removal sequence and location of salvageable items; location and construction of barricades, fences, and temporary work.

C. Design Data: Submit calculations for bracing, shoring, and underpinning signed and sealed by professional engineer.

D. Submit copy of permits required by regulatory agencies for demolition and sidewalk and street closings.

E. Construction Plan: Submit construction waste management plan describing methods and procedures for implementation and monitoring compliance including the following:

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1. Transportation company hauling construction waste to waste processing facilities.
 2. Recycling and adaptive reuse processing facilities and waste type each facility will accept.
 3. Construction waste materials anticipated for recycling and adaptive reuse.
 4. On site sorting and site storage methods.
- F. Submit documentation with each application for payment substantiating construction waste management plan was maintained and goals are being achieved.
1. Trash: Quantity by weight deposited in landfills. Include associated fees, transportation costs, container rentals, and taxes for total cost of disposal.
 2. Salvaged Material: Quantity by weight with destination for each type of material salvaged for resale, recycling, or adaptive reuse. Include associated fees, transportation costs, container rentals, and taxes for total cost of disposal. Also include reimbursements due to salvage resale.
 3. Total Cost: Indicate total cost or savings for implementation of construction waste management plan.

1.3 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations of capped utilities, subsurface obstructions, and other structures.
- C. Project Record Documents: Submit completed USGBC LEED NC Letter Template indicating diverted waste quantity, total waste quantity and percentage of waste diverted from landfills.

1.4 CONSTRUCTION WASTE MANAGEMENT PLAN

- A. Construction Waste Landfill Diversion: Minimum 75 percent by weight of construction waste materials for duration of Project through resale, recycling, or adaptive reuse.
- B. Implement construction waste management plan at start of construction.
- C. Review construction waste management plan at pre-demolition meeting and progress meetings specified in Section 01 30 00.
- D. Distribute approved construction waste management plan to subcontractors and others affected by Plan Requirements.
- E. Oversee plan implementation, instruct construction personnel for plan compliance, and document plan results.
- F. Purchase Products to prevent waste by:

1. Ensuring correct quantity of each material is delivered to site.
2. Choosing products with minimal or no packaging.
3. Requiring suppliers to use returnable pallets or containers.
4. Requiring suppliers to take or buy-back rejected or unused items.

1.5 CONSTRUCTION WASTE ADAPTIVE RE-USE

A. Arrange with processing facility for salvage of construction material and processing for reuse. Do not reuse construction materials on site except as accepted by Architect/Engineer.

B. Materials suggested for adaptive reuse include:

1. Concrete and crushed concrete.
2. Masonry units.
3. Lumber suitable for re-sawing or refinishing.
4. Casework and millwork.
5. Doors and door frames.
6. Windows.
7. Window glass and insulating glass units.
8. Hardware.
9. Equipment and appliances.
10. Fluorescent light fixtures and lamps.

1.6 QUALITY ASSURANCE

A. Conform to applicable code for demolition of structures, safety of adjacent structures, dust control, stormwater runoff control, disposal, and.

B. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.

C. Obtain required permits from authorities having jurisdiction.

D. Perform Work in accordance with State of Ohio standard.

1.7 QUALIFICATIONS

A. Demolition Firm: Company specializing in performing work of this section with minimum five years documented experience.

- 1 1. Owner has the right to reject the proposed demolition subcontractor.
- 2 B. Design shoring, bracing, and underpinning under direct supervision of Professional
- 3 Engineer experienced in design of this Work and licensed at Project location.
- 4 1.8 PRE-INSTALLATION MEETINGS
- 5 A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- 6 B. Convene minimum one week prior to commencing work of this section.
- 7 1.9 SEQUENCING
- 8 A. Section 01 10 00 - Summary: Requirements for sequencing.
- 9 B. Sequence activities to demolish existing buildings in the following order stages:
- 10 1. See drawings C101 and C102 for sequencing.
- 11 1.10 SCHEDULING
- 12 A. Section 01 30 00 - Administrative Requirements 01 32 16 - Construction Progress
- 13 Schedule: Requirements for scheduling.
- 14 B. Schedule Work to precede and coincide with new construction.
- 15 C. Describe demolition removal procedures and schedule.
- 16 D. Perform Work between hours of 7:00 AM and 5:00 PM.
- 17 1.11 PROJECT CONDITIONS
- 18 A. Buildings indicated to be demolished will be vacated before start of Work.
- 19 B. Owner assumes no responsibility for actual condition of buildings to be demolished.
- 20 C. Notify Architect/Engineer upon discovery of hazardous materials.
- 21 D. Do not sell demolished materials on-site.
- 22 E. Maintain existing sidewalks to greatest extent possible.
- 23 PART 2 PRODUCTS
- 24 2.1 FILL MATERIALS
- 25 A. Fill Material: As specified in Section 31 23 23, Fill.
- 26 PART 3 EXECUTION
- 27 3.1 EXISTING BUILDING DOCUMENTATION

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- A. Document condition of adjacent structures buildings indicated to remain.
- B. Make arrangements with building owners and occupants to survey interior and exterior of existing buildings.

3.2 EXAMINATION

- A. Examine existing buildings indicated to be demolished before demolition.
- B. Determine where removals may result in structural deficiency or unplanned building collapse during demolition. Coordinate demolition sequence and procedures to prevent structures from becoming unstable.
- C. Determine where demolition may affect structural integrity or weather resistance of adjacent buildings indicated to remain.
 - 1. Identify measures required to protect buildings from damage.
 - 2. Identify remedial work including patching, repairing, bracing, and other work required to leave buildings indicated to remain in structurally sound and weathertight and watertight condition.
- D. Verify hazardous material abatement is complete before beginning demolition.

3.3 PREPARATION

- A. Call Local Utility Line Information service at not less than ten working days before performing Work.
 - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Notify affected utility companies before starting work and comply with utility's requirements.
- C. Do not close or obstruct roadways, sidewalks, or hydrants without permits.
- D. Erect, and maintain temporary barriers and security devices at locations indicated, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.
- E. Protect existing landscaping materials, trees, appurtenances, structures, and site lighting indicated to remain.
- F. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.
- G. Test soils around underground tanks for contamination.

3.4 DEMOLITION REQUIREMENTS

- A. Use of explosives is not permitted.

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- B. Conduct demolition to minimize interference with adjacent structures. and occupancies.
- C. Cease operations immediately when adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until directed.
- D. Conduct operations with minimum interference to public or private accesses to occupied adjacent structures. Maintain protected egress and access from adjacent structures at all times.
- E. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon or limit access to their property.
- F. Sprinkle Work with water to minimize dust. Provide hoses and water connections required for this purpose.

3.5 DEMOLITION

- A. Disconnect remove and cap designated utilities and utility structures to street connection or at other location as shown on drawings. Identify utilities at termination of demolition. Record termination or capped location on Record Documents.
- B. Remove foundation walls and footings to minimum of two feet below finished grade beyond area of new construction and in there entirety where shown on drawings.
- C. Remove concrete slabs-on-grade.
- D. Empty underground tanks located within demolition area.
- E. Remove underground tanks, components, and piping from site.
- F. Remove materials to be re-installed or retained in manner to prevent damage. Store and protect in accordance with requirements of Section 01 60 00 - Product Requirements.
- G. Backfill areas excavated and open pits and holes resulting from demolition, in accordance with Section 31 23 23.
- H. Rough grade and compact areas affected by demolition to accommodate subsequent construction operations.
- I. Continuously clean-up and remove demolished materials from site. Do not allow materials to accumulate in building or on site.
- J. Do not burn or bury materials on site. Leave site in clean condition.

3.6 CONSTRUCTION WASTE COLLECTION

- A. Collect construction waste materials in marked bins or containers and arrange for transportation to recycling centers or adaptive salvage and reuse processing facilities.
- B. Maintain recycling and adaptive reuse storage and collection area in orderly arrangement with materials separated to eliminate co-mingling of materials required to be delivered separately to waste processing facility.

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1 C. Store construction waste materials to prevent environmental pollution, fire hazards,
2 hazards to persons and property, and contamination of stored materials.

3 D. Cover construction waste materials subject to disintegration, evaporation, settling, or
4 runoff to prevent polluting air, water, and soil.

5 3.7 CONSTRUCTION WASTE DISPOSAL

6 A. Deliver construction waste to waste processing facilities. Obtain receipt for deliveries.

7 B. Dispose construction waste not capable of being recycled or adaptively reused by delivery
8 to landfill, incinerator, or other legal disposal facility. Obtain receipt for deliveries.

9 END OF SECTION

SECTION 02 65 00

UNDERGROUND STORAGE TANK REMOVAL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Remove 15,000 gallon diesel fuel tank.
2. Remove 2,500 gallon gasoline tank.

B. Related Sections:

1. Section 31 23 16 - Excavation.
2. Section 31 23 23 - Fill.

1.2 REFERENCES

A. American Petroleum Institute Publications:

1. API 1604 - Removal and Disposal of Used Underground Petroleum Storage Tanks.

B. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
2. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
3. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
4. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

C. National Fire Protection Association:

1. NFPA 241- Safeguarding Construction, Alteration and Demolition Operations.

1.3 SYSTEM DESCRIPTION

- A. Existing Storage Tanks: 15,000 gallon diesel storage tank and 2,500 gallon gasoline fuel tank is located near a fuel island northwest of the existing transfer station. Tanks lie beneath the concrete pavement.

1.4 SUBMITTALS

Morse Road Transfer Station, Columbus, OH

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit three 10 lb soil samples for contamination testing at each tank (six total samples).
- C. Test Reports: Indicate test results of soil samples.
- D. Certificates: Submit certificates for tank removal company and site personnel issued by agency regulating tank removal.
- E. Disposal Records: Submit documentation satisfactory to Owner, attesting to final and legal disposal of waste materials removed from site. [Include records for the following:]
 - 1. Tank contents.
 - 2. Tank sludge.
 - 3. Tank flush and wash water.
 - 4. Contaminated soil.
 - 5. Tanks.
 - 6. Tank foundations.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record actual locations of tank removal, capped piping, and electrical services.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
 - 1. United States Environmental Protection Agency.
 - 2. State of Ohio Department of Environmental Protection.
- B. Perform Work in accordance with State of Ohio standard.

1.8 QUALIFICATIONS

- A. Tank Removal Company: Company specializing in performing work of this section [with minimum five years documented experience certified by local agency regulating tank removal.
- B. Removal, Testing, and Inspection Site Personnel: Individuals specializing in performing work of this section with minimum five years documented experience certified by local agency regulating tank removal.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Prevent surface runoff from entering excavation.
- C. Prevent erosion of soil stockpile to prevent spreading contamination.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work with Owner for tank removal.

PART 2 PRODUCTS

2.1 BACKFILL AND COVER MATERIALS

- A. Backfill: Fill Type as specified in Section 31 23 23.
- B. Cover: Fill Type as specified in Section 31 23 23.
- C. Soil Backfill: Soil Type as specified in Section 31 23 23.

2.2 ACCESSORIES

- A. Plastic:
 - 1. Provide plastic cover in accordance with State or Local regulations.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify location and number of underground tanks to be removed.

3.2 PREPARATION

- A. Notify regulating agencies regarding tank removal activities.
- B. Obtain licenses, permits, and inspections required for tank removal and disposal.
- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Mark location of utilities.
- E. Permanently disconnect storage system-related electrical circuits before initiation of excavation work.

3.3 EXCAVATION

- A. Excavate in accordance with Section 31 23 16 for Work of this Section.
- B. Remove cover over tank including concrete, macadam, concrete, and soil, as needed to facilitate tank removal.
- C. Stockpile removed soil.
- D. Stockpile soil exhibiting potential contamination, separate from uncontaminated soil.
- E. Store contaminated soil on plastic and cover with plastic until soil testing and analysis is complete.

3.4 UNDERGROUND STORAGE TANK DECOMMISSIONING

- A. Pump out product residuals and sludge into storage tanks or tanker transport in accordance with Ohio regulatory agency requirements.
- B. Remove drop tube, fill pipe, gauge pipe, vapor recovery fitting and other tank fixtures. Maintain vent line until tank is purged.
- C. Carefully drain piping completely into tank to avoid spillage to excavation area. Disconnect product piping from tank.
- D. Remove piping runs.
- E. Purge tanks of flammable vapors in accordance with API 1604.
- F. After purging tanks, flush tank sides, remove sludge, and pressure wash entire tank. Remove tank contents and legally dispose.

3.5 UNDERGROUND STORAGE TANK REMOVAL AND BACKFILL

- A. Carefully remove tank and accessories and legally dispose. Do not crush or cut tanks on site.
- B. Remove concrete pad underlying tank when indication of contamination within excavation is discovered and integrity of concrete pad is questionable.
- C. Break-up concrete pads left in place.
- D. Backfill excavation in accordance with Section 31 23 23. Provide imported [soil backfill] materials to replace contaminated soil to complete backfilling [to subgrade].

3.6 WASTE DISPOSAL

- A. Collect waste from construction area, daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris.
- B. Handle hazardous, dangerous or unsanitary waste materials separately from other waste, containerize properly, and legally dispose off-site.

C. Remove debris, rubbish, and other materials resulting from tank removal operations. Transport and legally dispose off-site.

1. When hazardous materials are encountered during tank removal operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

2. Burning of removed materials is not permitted on project site.

3. Properly ventilate heating oil storage tank to abate explosion possibility during disposal handling.

4. Pay for required weighing and measuring fees and charges to legally dispose waste materials off-site.

D. Remove contaminated soil and legally dispose off-site.

E. Stockpile uncontaminated subsoil in area designated on site to depth not exceeding 8 feet and protect from erosion.

3.7 FIELD QUALITY CONTROL

A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.

B. Visually inspect for soil possible contamination.

C. When possible contamination is discovered during tank excavation, collect soil samples and test soil in accordance with State or Local regulations for contamination to determine soil disposal requirements.

D. Compaction Testing for Bedding: In accordance with ASTM D1557.ASTM D698. D6938

E. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

F. Frequency of Compaction Tests: Every 500 cubic yards.

END OF SECTION

SECTION 03 10 00

CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Formwork for cast-in place concrete.
2. Shoring, bracing, and anchorage.
3. Architectural form liners.
4. Form accessories.
5. Form stripping.

B. Related Sections:

1. Section 03 20 00 - Concrete Reinforcing.
2. Section 03 30 00 - Cast-In-Place Concrete.
3. Section 05 50 00 - Metal Fabrications: Product requirements for metal fabrications for placement by this Section.

1.2 REFERENCES

A. American Concrete Institute:

1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
2. ACI 301 - Specifications for Structural Concrete.
3. ACI 318 - Building Code Requirements for Structural Concrete.
4. ACI 347 - Guide to Formwork for Concrete.

B. American Forest and Paper Association:

1. AF&PA - National Design Specifications for Wood Construction.

C. The Engineered Wood Association:

1. APA/EWA PS 1 - Voluntary Product Standard for Construction and Industrial Plywood.

D. American Society of Mechanical Engineers:

1. ASME A17.1 - Safety Code for Elevators and Escalators.

E. ASTM International:

1. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

2. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

1.3 DESIGN REQUIREMENTS

A. Design, engineer and construct formwork, shoring and bracing in accordance with applicable code requirements to achieve concrete shape, line and dimension as indicated on Drawings.

1.4 PERFORMANCE REQUIREMENTS

A. Vapor Retarder Permeance: Maximum 1 perm perms when tested in accordance with ASTM E96/E96M, desiccant method water method.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 347 ACI 301 and ACI 318.

B. For wood products furnished for work of this Section, comply with AF&PA.

1.7 QUALIFICATIONS

A. Design formwork under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Ohio.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Products storage and handling requirements.

B. Deliver void forms and installation instructions in manufacturer's packaging.

C. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

1.9 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

PART 2 PRODUCTS

2.1 WOOD FORM MATERIALS

A. Form Materials: At discretion of Contractor.

B. Lumber Forms:

1. Application: Use for edge forms and unexposed finish concrete.

2. Boards: 6 inches or 8 inches in width, shiplapped or tongue and groove, "Standard" Grade Douglas Fir, conforming to WCLIB Standard Grading Rules for West Coast Lumber. Surface boards on four sides.

C. Plywood Forms:

1. Application: Use for exposed finish concrete.

2. Forms: Conform to PS 1; full size 4 x 8 feet panels; each panel labeled with grade trademark of APA/EWA.

3. Plywood for Surfaces to Receive Membrane Waterproofing: Minimum of 5/8 inch thick; APA/EWA "B-B Plyform Structural I Exterior" grade.

4. Plywood where "Smooth Finish" is required, as indicated on Drawings: APA/EWA "HD Overlay Plyform Structural I Exterior" grade, minimum of 3/4 inch thick.

2.2 PREFABRICATED FORMS

A. Manufacturers:

1. Aluma-Systems Inc., Burke Co.

2. Economy Forms Corp.

3. Molded Fiber Glass Concrete Forms Co.

4. Sonoco Products Co

5. Symons Corp.

6. Western Forms, Inc.

7. Substitutions: Section 01 60 00 - Product Requirements.

B. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.

C. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.

- D. Pan Type: Steel or Glass fiber of size and profile required.
 - E. Tubular Column Type: Round, spirally wound laminated fiber wood or glass fiber material, surface treated with release agent, non-reusable, sizes as indicated on Drawings.
 - 1. Substitutions: Section 01 60 00 - Product Requirements
 - F. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set.
 - G. Substitutions: Section 01 60 00 - Product Requirements.
 - H. Steel Forms: Sheet steel, suitably reinforced, and designed for particular use indicated on Drawings.
 - I. Form Liners: Smooth, durable, grainless and non-staining hardboard, unless otherwise indicated on Drawings.
 - J. Framing, Studding and Bracing: Stud or No. 3 structural light framing grade.
- 2.3 FORMWORK ACCESSORIES
- A. Form Ties: Removable type, galvanized metal, adjustable length, cone type, with waterproofing washer, free of defects capable of leaving holes larger than 1 inch in concrete surface.
 - B. Spreaders: Standard, non-corrosive metal form clamp assembly, of type acting as spreaders and leaving no metal within 1 inch of concrete face. Wire ties, wood spreaders or through bolts are not permitted.
 - C. Form Anchors and Hangers:
 - 1. Do not use anchors and hangers exposed concrete leaving exposed metal at concrete surface.
 - 2. Symmetrically arrange hangers supporting forms from structural steel members to minimize twisting or rotation of member.
 - 3. Penetration of structural steel members is not permitted.
 - D. Form Release Agent: Colorless mineral oil that will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
 - 1. Manufacturers:
 - a. Arcal Chemical Corporation Arcal-80.
 - b. Industrial Synthetics Company Synthex.
 - c. Nox-Crete Company Nox-Crete Form Coating.
 - d. Substitutions: Section 01 60 00 - Product Requirements
 - E. Corners: Chamfer, rigid plastic wood strip type; inch size; maximum possible lengths.

- 1 F. Dovetail Anchor Slot: Galvanized steel, 22 gage thick, foam filled release tape sealed slots,
2 anchors for securing to concrete formwork.
- 3 G. Flashing Reglets: Galvanized steel Rigid PVC, 22 gage thick, longest possible lengths,
4 with alignment splines for joints, foam filled non-filled, release tape sealed slots, anchors
5 for securing to concrete formwork.
- 6 H. Vapor Retarder: Where indicated on Drawings, 8 mil thick polyethylene sheet.
- 7 I. Bituminous Joint Filler: ASTM D1751.
- 8 J. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to
9 maintain formwork in place while placing concrete.
- 10 K. Waterstop: Flexible strip of bentonite waterproofing compound in coil form for joints in
11 concrete construction.
- 12 1. Colloid Environmental Technologies Company
- 13 2. TC MiraDRi
- 14 3. Paramount Technical Products
- 15 4. Substitutions: Section 01 60 00 - Product Requirements.

16 2.4 COATINGS

- 17 A. Coatings for Aluminum: Polyamide epoxy finish coat with paint manufacturer's
18 recommended primer for aluminum substrate. Apply one coat primer and one coat finish.

19 PART 3 EXECUTION

20 3.1 EXAMINATION

- 21 A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- 22 B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions
23 agree with Drawings.
- 24 C. When formwork is placed after reinforcement resulting in insufficient concrete cover over
25 reinforcement before proceeding, request instructions from Architect/Engineer.

26 3.2 INSTALLATION

- 27 A. Earth Forms:
- 28 1. Trench earth forms neatly, accurately, and at least 2 inches wider than footing
29 widths indicated on Drawings.
- 30 2. Trim sides and bottom of earth forms.

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3. Construct wood edge strips at top of each side of trench to secure reinforcing and prevent trench from sloughing.
4. Form sides of footings where earth sloughs.
5. Tamp earth forms firm and clean forms of debris and loose material before depositing concrete.

B. Formwork - General:

1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
5. Complete wedging and bracing before placing concrete.

C. Forms for Smooth Finish Concrete:

1. Use steel, plywood or lined board forms.
2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
3. Install form lining with close-fitting square joints between separate sheets without springing into place.
4. Use full size sheets of form lines and plywood wherever possible.
5. Tape joints to prevent protrusions in concrete.
6. Use care in forming and stripping wood forms to protect corners and edges.
7. Level and continue horizontal joints.
8. Keep wood forms wet until stripped.

D. Architectural Form Liners:

1. Erect architectural side of formwork first.
2. Attach form liner to forms before installing form ties.

3. Install form liners square, with joints and pattern aligned.
4. Seal form liner joints to prevent grout leaks.
5. Dress joints and edges to match form liner pattern and texture.
- E. Forms for Surfaces to Receive Membrane Waterproofing: Use plywood or steel forms. After erection of forms, tape form joints to prevent protrusions in concrete.
- F. Framing, Studding and Bracing:
 1. Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood.
 2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
 3. Construct beam soffits of material minimum of 2 inches thick.
 4. Distribute bracing loads over base area on which bracing is erected.
 5. When placed on ground, protect against undermining, settlement or accidental impact.
- G. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 301 and ACI 318.
- H. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- I. Obtain Architect/Engineer's approval before framing openings in structural members not indicated on Drawings.
- J. Install chamfer strips on external corners.
- K. Install void forms in accordance with manufacturer's recommendations.

3.3 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Do not coat forms

for concrete indicated to receive “scored finish”. Apply form coatings before placing reinforcing steel.

3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Install formed openings for items to be embedded in or passing through concrete work.

B. Locate and set in place items required to be cast directly into concrete.

C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.

E. Install accessories straight, level, and plumb. Ensure items are not disturbed during concrete placement.

F. Install water stops continuous without displacing reinforcement.

G. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

H. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

I. Form Ties:

1. Use sufficient strength and sufficient quantity to prevent spreading of forms.

2. Place ties at least 1 inch away from finished surface of concrete.

3. Leave inner rods in concrete when forms are stripped.

4. Space form ties equidistant, symmetrical and aligned vertically and horizontally unless otherwise shown on Drawings.

J. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.

K. Construction Joints:

1. Install surfaced pouring strip where construction joints intersect exposed surfaces to provide straight line at joints.

2. Just prior to subsequent concrete placement, remove strip and tighten forms to conceal shrinkage.

3. Show no overlapping of construction joints. Construct joints to present same appearance as butted plywood joints.

4. Arrange joints in continuous line straight, true and sharp.

L. Embedded Items:

1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
2. Do not embed wood or uncoated aluminum in concrete.
3. Obtain installation and setting information for embedded items furnished under other Specification sections.
4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.

M. Openings for Items Passing Through Concrete:

1. Frame openings in concrete where indicated on Drawings. Establish exact locations, sizes, and other conditions required for openings and attachment of work specified under other sections.
2. Coordinate work to avoid cutting and patching of concrete after placement.
3. Perform cutting and repairing of concrete required as result of failure to provide required openings.

N. Screeds:

1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
2. Slope slabs to drain where required or as shown on Drawings.
3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.

O. Screed Supports:

1. For concrete over waterproof membranes and vapor retarder membranes, use cradle, pad or base type screed supports which will not puncture membrane.
2. Staking through membrane is not be permitted.

P. Cleanouts and Access Panels:

1. Provide removable cleanout sections or access panels at bottoms of forms to permit inspection and effective cleaning of loose dirt, debris and waste material.
2. Clean forms and surfaces against which concrete is to be placed. Remove chips, saw dust and other debris. Thoroughly blow out forms with compressed air just before concrete is placed.

3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

3.6 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect/Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347.

3.7 ERECTION TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301 and ACI 318.

3.8 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- C. Notify Architect/Engineer after placement of reinforcing steel in forms, but prior to placing concrete.
- D. Schedule concrete placement to permit formwork inspection before placing concrete.

END OF SECTION

SECTION 03 20 00

CONCRETE REINFORCING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Reinforcing bars.
2. Reinforcement accessories.

B. Related Sections:

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

1.2 REFERENCES

A. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 318 - Building Code Requirements for Structural Concrete.
3. ACI 530.1 - Specifications for Masonry Structures.
4. ACI SP-66 - ACI Detailing Manual.

B. ASTM International:

1. ASTM A82/A82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.
2. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
3. A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
4. ASTM A496/A496M - Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
5. ASTM A497/A497M - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
6. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

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7. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.
8. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
9. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
10. ASTM A775/A775M - Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
11. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
12. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
13. ASTM A996/A996M - Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement.

C. American Welding Society:

1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.

D. Concrete Reinforcing Steel Institute:

1. CRSI - Manual of Standard Practice.
2. CRSI - Placing Reinforcing Bars.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate bar sizes, spacings, locations, and quantities of reinforcing steel and welded wire fabric, bending and cutting schedules, and supporting and spacing devices.
- C. Certificates: Submit AWS qualification certificate for welders employed on the Work.
- D. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI - Manual of Standard Practice ACI 301 and ACI 318.
- B. Prepare shop drawings in accordance with ACI SP-66.

1.6 QUALIFICATIONS

- A. Welders: AWS qualified within previous 12 months.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate with placement of formwork, formed openings and other Work.

PART 2 PRODUCTS

2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars, uncoated finish.
- B. Deformed Wire: ASTM A496/A496M; unfinished.

2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type
- B. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.
- C. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic-coated steel type; size and shape to meet Project conditions.
- D. Reinforcing Splicing Devices: Mechanical threaded type; full tension sized to fit joined reinforcing.

2.3 FABRICATION

- A. Fabricate concrete reinforcement in accordance with CRSI Manual of Practice .
- B. Form standard hooks for 90 degree, 135 degree, or 180 degree bends, as indicated on Drawings.
- C. Form reinforcement bends with minimum diameters in accordance with ACI 318.
- D. Fabricate column reinforcement with offset bends at reinforcement splices.
- E. Form spiral column reinforcement from minimum 3/8 inch diameter continuous deformed bar or wire.
- F. Form ties and stirrups from the following:
 - 1. For bars No. 10 and Smaller: No. 3 deformed bars.
 - 2. For bars No. 11 and Larger: No. 4 deformed bars.
- G. Weld reinforcement in accordance with AWS D1.4.

- H. Locate reinforcement splices not indicated on Drawings, at point of minimum stress. Review location of splices with Architect/Engineer.

2.4 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.

- B. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.

1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.

1. Do not weld crossing reinforcement bars for assembly except as permitted by Engineer.

- B. Do not displace or damage vapor retarder.

- C. Accommodate placement of formed openings.

- D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318.

1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.

- E. Maintain concrete cover around reinforcement in accordance with ACI 318 :

Reinforcement Location		Minimum Concrete Cover
Footings and Concrete Formed Against Earth		3 inches
Concrete exposed to earth or weather	No. 6 bars and larger	2 inches
	No. 5 bars and smaller	1-1/2 inches
Walls	No. 14 bars and larger	1-1/2 inches
	No. 11 bars and smaller	3/4 inches
Piers		1-1/2 inches

- F. Splice reinforcing in accordance with splicing device manufacturer's instructions.

3.2 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.

- B. Install reinforcement within the following tolerances for flexural members, walls, and compression members:

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Reinforcement Depth	Depth Tolerance	Concrete Cover Tolerance
Greater than 8 inches	plus or minus 3/8 inch	minus 3/8 inch
Less than 8 inches	plus or minus 1/2 inch	minus 1/2 inch

C. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.

3.3 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements:
Field inspecting, testing, adjusting, and balancing.

B. Perform field inspection and testing in accordance with applicable Ohio Building code.

C. Provide free access to Work and cooperate with appointed firm.

D. Reinforcement Inspection:

1. Placement Acceptance: Specified material requirements and specified placement tolerances.

2. Welding: Inspect welds in accordance with AWS D1.1.

3. Periodic Placement Inspection: Inspect for correct materials, fabrication, sizes, locations, spacing, concrete cover, and splicing.

4. Weldability Inspection: Inspect for reinforcement weldability when formed from steel other than ASTM A706/A706M.

5. Continuous Weld Inspection: Inspect reinforcement as required by applicable code and statement of special inspections.

6. Periodic Weld Inspection: Other welded connections.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete for the following:

1. Foundation walls and footings.
2. Interior slabs on grade
3. Isolation joint devices.
4. Interior equipment pads.

B. Related Sections:

1. Section 03 10 00 - Concrete Forming and Accessories:
2. Section 03 20 00 - Concrete Reinforcing.
3. Section 09 90 00 - Painting and Coatings.
4. Section 31 23 23 - Fill

1.2 REFERENCES

A. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 305 - Hot Weather Concreting.
3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
4. ACI 308.1 - Standard Specification for Curing Concrete.
5. ACI 318 - Building Code Requirements for Structural Concrete.

B. ASTM International:

1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
2. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
3. ASTM C33 - Standard Specification for Concrete Aggregates.

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- 1 4. ASTM C39/C39M - Standard Test Method for Compressive Strength of
2 Cylindrical Concrete Specimens.
- 3 5. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled
4 Cores and Sawed Beams of Concrete.
- 5 6. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
- 6 7. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement
7 Concrete.
- 8 8. ASTM C150 - Standard Specification for Portland Cement.
- 9 9. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
- 10 10. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed
11 Concrete by the Volumetric Method.
- 12 11. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete
13 by the Pressure Method.
- 14 12. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
- 15 13. ASTM C330 - Standard Specification for Lightweight Aggregates for Structural
16 Concrete.
- 17 14. ASTM C494/C494M - Standard Specification for Chemical Admixtures for
18 Concrete.
- 19 15. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
- 20 16. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined
21 Natural Pozzolan for Use as a Mineral Admixture in Concrete.
- 22 17. ASTM C685/C685M - Standard Specification for Concrete Made By Volumetric
23 Batching and Continuous Mixing.
- 24 18. ASTM C845 - Standard Specification for Expansive Hydraulic Cement.
- 25 19. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag
26 for Use in Concrete and Mortars.
- 27 20. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use
28 in Producing Flowing Concrete.
- 29 21. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed
30 Hydraulic-Cement Concrete.
- 31 22. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-
32 Cement Grout (Nonshrink).

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23. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and Shotcrete.
24. ASTM C1157 - Standard Performance Specification for Hydraulic Cement.
25. ASTM C1218/C1218M - Standard Test Method for Water-Soluble Chloride in Mortar and Concrete.
26. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.
27. ASTM D994 - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).
28. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
29. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
30. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.
31. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
32. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
33. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
34. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

1.3 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: 0.1 perms when tested in accordance with ASTM E96/E96M, desiccant method water method.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on joint devices, attachment accessories and, admixtures.
- C. Design Data:
 1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:

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- a. Hot and cold weather concrete work.
- b. Air entrained concrete work.

2. Identify mix ingredients and proportions, including admixtures.

3. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

D. Manufacturer's Installation Instructions: Submit installation procedures and interface required with adjacent Work.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

B. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and ACI 318.

B. Conform to ACI 305 when concreting during hot weather.

C. Conform to ACI 306.1 when concreting during cold weather.

D. Acquire cement and aggregate from one source for Work.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.

1.10 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement:

1. ASTM C150, Type I - Normal Portland type

2. ASTM C150, Type II for interior slab on grade

1 B. Normal Weight Aggregates: ASTM C33.

2 1. Coarse Aggregate Maximum Size: In accordance with ACI 318.

3 C. Water: ACI 318; potable, without deleterious amounts of chloride ions.

4 2.2 ADMIXTURES

5 A. Air Entrainment: ASTM C260.

6 B. Chemical: ASTM C494/C494M.

7 1. Type A - Water Reducing.

8 2. Type B - Retarding.

9 3. Type C - Accelerating.

10 4. Type D - Water Reducing and Retarding.

11 5. Type E - Water Reducing and Accelerating.

12 6. Type F - Water Reducing, High Range.

13 7. Type G - Water Reducing, High Range and Retarding.

14 C. Fly Ash ASTM C618 Class C

15 D. Slag: ASTM C989; Grade 80 100 120; ground granulated blast furnace slag.

16 E. Plasticizing: ASTM C1017/C1017M Type I, plasticizing or Type II, plasticizing and
17 retarding.

18 2.3 ACCESSORIES

19 A. Vapor Retarder: ASTM E1745 Class C; 15 mil thick clear ; type recommended for below
20 grade application. Furnish joint tape recommended by manufacturer.

21 B. 4" Thick layer of trimmable, compactible granular fill (Not sand): Material conforming to
22 ASTM D448 No. 10 with plenty of rock fines.

23 C. Non-Shrink Grout: ASTM C1107/C1107M; premixed compound consisting of non-
24 metallic aggregate, cement, water reducing and plasticizing agents; capable of developing
25 minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

26 D. Steel Reinforcement: See specification section 03 20 00 Concrete Reinforcing

27 E. Fiber Reinforcement Materials: Shall be a blend of steel fiber and 100 percent virgin
28 homopolymer polypropylene graded multifilament fiber containing no reprocessed olefin
29 materials complying with ASTM C1116, Paragraph 4.1.3, Type III and ASTM A820.
30 Novomesh 850 or equal (submit " or equal" product for acceptance) Chemical and
31 Physical Properties Polypropylene Component:

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Absorption	Nil
Specific Gravity	0.91
Fiber Length	Multi-Design Gradation
Melt Point	324 degrees F
Steel Component	
Tensile Strength	140-180 ksi
Fiber Length	1.5"

- F. Non-slip Aggregate Finish: For stairs, landings, platforms and where otherwise indicated provide fused aluminum oxide grits, or crushed emery, as abrasive aggregate for non-slip finish with emery aggregate containing no less than 40 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rust-proof, and non-glassing, and is unaffected by freezing, moisture, and cleaning materials. Submit samples for Architect's approval.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A:ASTM D994; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile
- B. Sealant and Primer: type, as specified in Section 07 90 00.
1. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

2.5 CONCRETE MIX

- A. Select proportions for concrete in accordance with ACI 318 trial mixtures or field experience or both.
- B. Concrete Mix supplier shall submit the following data for all materials to be used in interior slab on grade.
1. Cement mortar shrinkage tests per ASTM C157
2. Combined aggregate distribution analysis derived from current, certified reports of gradation of individual aggregates for all aggregates
3. Prediction of Shrinkage potential of concrete following ACI 209 Prediction of Creep, Shrinkage, and Temperature Effects in Concrete Structures procedure.
4. If concrete mix supplier has sufficient data
- C. Provide concrete to the following criteria:

All Footings	
Material and Property	Measurement
Compressive Strength (28 day)	4000 psi

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Cement Type	ASTM C150
Cement Content (minimum)	470 pounds/cu yd
Aggregate Type	Normal weight
Aggregate Size (maximum)	1 ½ inch
Air Content	None
GGBFS(Ground Granulated Blast Furnace Slag) and Fly Ash Content:	50% total replacement of Portland cement with GGBFS and fly ash at a 1:1 ratio up to 350 pounds with a maximum 20% fly
Fly Ash Alone	If fly ash is used alone, limit the maximum replacement to 20%.
Walls and Piers, Stoops, and Column Surrounds	
Material and Property	Measurement
Compressive Strength (28 day)	4000 psi
Cement Type	ASTM C150
Cement Content (minimum)	494 pounds/cu yd
Aggregate Type	Normal weight
Aggregate Size (maximum)	¾ inch
Air Content	None
GGBFS(Ground Granulated Blast Furnace Slag) and Fly Ash Content:	50% total replacement of Portland cement with GGBFS and fly ash at a 1:1 ratio up to 350 pounds with a maximum 20% fly
Fly Ash Alone	If fly ash is used alone, limit the maximum replacement to 20%.
Interior Slab on Grade in heated areas, slab on metal deck	
Material and Property	Measurement
Compressive Strength (28 day)	4000 psi
Cement Type	ASTM C150
Cement Content (minimum)	540 pounds/cu yd
Aggregate Type	Normal weight

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Fiber Reinforcement	36 pounds per cubic yard of concrete, or rebar where noted on plan
Water-Cement Ratio (maximum)	0.45 by weight
Aggregate Size (maximum)	¾ inch
Air Content	None
GGBFS(Ground Granulated Blast Furnace Slag) and Fly Ash Content:	50% total replacement of Portland cement with GGBFS and fly ash at a 1:1 ratio up to 350 pounds with a maximum 20% fly
Fly Ash Alone	If fly ash is used alone, limit the maximum replacement to 20%.
Tipping Slab Floor	
Material and Property	Measurement
Compressive Strength (28 day)	5000 psi
Cement Type	ASTM C150
Cement Content (minimum)	658 pounds/cu yd
Aggregate Type	Normal Weight
Water-Cement Ratio (maximum)	0.40 by weight maximum
Aggregate Size (maximum)	1 inch
Air Content	6% plus or minus 1 ½ %
GGBFS (Ground Granulated Blast Furnace Slag) and Fly Ash Content:	30% total replacement of Portland cement with GGBFS and fly ash at a 1:1 ratio up to 350 pounds with a maximum 20% fly
Fly Ash Alone	If fly ash is used alone, limit the maximum replacement to 20%.

D. Admixtures: Include admixture types and quantities indicated in concrete mix designs only when approved by Engineer.

1. Use accelerating admixtures in cold weather. Use of admixtures will not relax cold weather placement requirements.
2. Do not use calcium chloride nor admixtures containing calcium chloride.
3. Use set retarding admixtures during hot weather.

4. Add air entrainment admixture to concrete mix for work exposed to freezing and thawing or deicing chemicals.

E. Average Compressive Strength Reduction: Permitted in accordance with ACI 318 Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M Site Mixed Concrete: Mix concrete in accordance with ACI 318.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify requirements for concrete cover over reinforcement.

C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

3.2 PREPARATION

A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.

B. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

C. Remove debris and ice from formwork, reinforcement, and concrete substrates.

D. Concrete surfaces shall be free of stains, gouges, and other visible unacceptable marks.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 301 and ACI 318.

B. Notify testing laboratory and Architect/Engineer minimum 24 hours prior to commencement of operations.

C. Ensure reinforcement, inserts, and embedded parts are not disturbed during concrete placement.

D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 12 inches and seal watertight by adhesive applied between overlapping edges and ends taping edges and ends.

E. Vapor retarder and 4" layer of trimmable, compactable granular fill shall not be installed until after roof deck is in place to prevent excess water from accumulating in the blotter layer. 4" layer shall be compacted in accordance with Specification 31 23 23 Fill Areas beneath Floor Slabs.

F. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 12 inches and seal watertight.

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- 1 G. Separate slabs on grade from vertical surfaces with 1/4 inch thick joint filler.
- 2 H. Place joint filler in floor slab pattern placement sequence. Set top to required elevations.
- 3 Secure to resist movement by wet concrete.
- 4 I. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface. Conform
- 5 to Section 07 90 00 for finish joint sealer requirements.
- 6 J. Install construction joint devices in coordination with floor slab pattern placement
- 7 sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- 8 K. Install joint device anchors. Maintain correct position to allow joint cover to be flush with
- 9 floor and wall finish.
- 10 L. Install joint covers in longest practical length, when adjacent construction activity is
- 11 complete. Apply sealants in joint devices in accordance with Section 07 90 00.
- 12 M. Deposit concrete at final position. Prevent segregation of mix.
- 13 N. Place concrete in continuous operation for each panel or section determined by
- 14 predetermined joints.
- 15 O. Consolidate concrete.
- 16 P. Maintain records of concrete placement. Record date, location, quantity, air temperature,
- 17 and test samples taken.
- 18 Q. Place concrete continuously between predetermined expansion, control, and construction
- 19 joints.
- 20 R. Do not interrupt successive placement; do not permit cold joints to occur.
- 21 S. Place floor slabs in checkerboard or saw cut pattern indicated.
- 22 T. Saw cut joints within 12 hours after placing. Use 3/16 inch thick blade, cut into 1/4 depth
- 23 of slab thickness.
- 24 U. Screed slabs on grade level, maintaining surface flatness of F_f of 20 maximum 1/4 inch in
- 25 10 ft.

26 3.4 CONCRETE FINISHING

- 27 A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.
- 28 B. Finish concrete floor surfaces in accordance with ACI 301 and ACI 318.
- 29 C. Steel trowel surfaces which are indicated to be exposed.
- 30 D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to
- 31 drains at 1/8 inch per foot nominal unless noted otherwise on plan.

32 3.5 CURING AND PROTECTION

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- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
 - 1. Protect concrete footings from freezing for minimum 5 days.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure floor surfaces in accordance with ACI 301 and ACI 318.
- D. Ponding: Maintain 100 percent coverage of water over floor slab areas continuously for 7 days.
- E. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
- F. Tipping floor concrete requires 28 day cure before use.

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform field inspection and testing in accordance with 2007 Ohio Building code.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Submit proposed mix design of each class of concrete for review prior to commencement of Work.
- E. Concrete Inspections:
 - 1. Continuous Placement Inspection: Inspect for proper installation procedures.
 - 2. Periodic Curing Inspection: Inspect for specified curing temperature and procedures.
- F. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, field cured.
 - 3. Sample concrete and make one set of three cylinders for every 150 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.
 - 4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
 - 5. Make one additional cylinder during cold weather concreting, and field cure.

G. Field Testing:

1. Slump Test Method: ASTM C143/C143M.
2. Air Content Test Method: ASTM C173/C173M.
3. Temperature Test Method: ASTM C1064/C1064M.
4. Measure slump and temperature for each compressive strength concrete sample.
5. Measure air content in air entrained concrete for each compressive strength concrete sample.

H. Cylinder Compressive Strength Testing:

1. Test Method: ASTM C39/C39M.
2. Test Acceptance: In accordance with ACI 318.
3. Test one cylinder at 7 days.
4. Test two cylinders at 28 days.
5. Retain one cylinder for 56 days for testing when requested by Architect/Engineer.
6. Dispose remaining cylinders when testing is not required.

I. Core Compressive Strength Testing:

1. Sampling and Testing Procedures: ASTM C42/C42M.
2. Test Acceptance: In accordance with ACI 318.
3. Drill three cores for each failed strength test from concrete represented by failed strength test.

J. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

3.7 PATCHING

- A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
- C. Patch imperfections in accordance with ACI 301 and ACI 318

3.8 DEFECTIVE CONCRETE

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1 A. Defective Concrete: Concrete not conforming to required lines, details, dimensions,
2 tolerances or specified requirements.

3 B. Repair or replacement of defective concrete will be determined by Architect/Engineer.

4 END OF SECTION

SECTION 03 60 00

GROUT

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Portland cement grout.
2. Non-shrink cementitious grout.

B. Related Sections:

1. Section 03 30 00 – Cast-In-Place Concrete.

1.2 REFERENCES

A. Abbreviations and Acronyms:

1. American Concrete Institute (ACI).
2. American Society of Testing and Materials (ASTM).

B. American Concrete Institute:

1. ACI 301 – Specifications for Structural Concrete.
2. ACI 305.1 – Specification for Hot Weather Concreting.
3. ACI 306.1 – Standard Specification for Cold Weather Concreting.
4. ACI 318 - Building Code Requirements for Structural Concrete.
5. ACI 351.1R – Report on Grouting Between Foundations and Bases for Support of Equipment and Machinery.

C. American Society of Testing and Materials:

1. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
2. ASTM C150 – Standard Specification for Portland Cement.
3. ASTM C1602 – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
4. ASTM C33 – Standard Specification for Concrete Aggregates.

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

6. ASTM C1107 – Standard Test Methods for Physical Testing of Quicklime, Hydrated Lime, and Limestone.

7. ASTM C827 – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.

D. U. S. Army Corps of Engineers Concrete Research Division (CRD):

1. CRD C621 – Non-Shrink Grout.

1.3 SUBMITTALS

A. Refer to the Submittal Schedule at the end of Part 3 for a list of submittal requirements for this Section.

1.4 QUALITY ASSURANCE

A. Grout Pre-Construction Meeting:

1. For Work specified herein, attend grout pre-construction meeting scheduled at least 14 days before starting grouting.

2. Attendees to include representatives designated and technical representatives of grout manufacturers.

3. Representatives to be personnel who are directly involved in Project and who have authority to control Work.

B. Grouting: Correct grouting which does not conform to specified requirements including strength, shrinkage, flow-ability, and bleeding as directed at no additional cost and no extension of Contract time.

C. Testing/inspection agencies should be in conformance with ASTM E329.

D. Maintain one copy of each document on site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver grout in manufacturer's unopened containers with proper labels and protective packaging intact.

B. Store grout off the ground in a dry shelter; protect grout from moisture while stored and handled.

C. Store coarse aggregate on a smooth hard surface and protect from mixture with foreign materials.

1.6 ENVIRONMENTAL REQUIREMENTS

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- A. Do not perform grouting if temperatures exceed 90 degrees F.
- B. Do not perform grouting during freezing conditions, rain, sleet, snow, or wind unless proper provisions/arrangements are provided.
- C. Maintain minimum temperature of 40 degrees F before, during, and after grouting, until grout has set.
- D. Grout should not be placed on or against frosted surfaces.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT GROUT

- A. Portland Cement: ASTM C150, Type I, I-II, or II.
- B. Water: ASTM C1602.
- C. Fine Aggregate:
 - 1. Washed natural sand.
 - 2. Gradation in accordance with ASTM C33 and represented by smooth granulometric curve within required limits.
 - 3. Free from injurious amounts of organic impurities as determined by ASTM C40.
- D. Mix:
 - 1. Portland cement, sand and water. Do not use ferrous aggregate or staining ingredients in grout mixes. See MIXING in Part 3 of this Section.

2.2 NON-SHRINK CEMENTITIOUS GROUT

- A. Manufacturer: Masterflow 928 by Master Builders or approved equivalent for column bases.
- B. Manufacturer: Masterflow 648 by Master Builders or approved equivalent for equipment bases.
- C. Non-Shrink Cementitious Grout: Pre-mixed ready for use formulation requiring only addition of water; non-shrink, non-corrosive, non-gas forming, no chlorides.
- D. Grout to maintain flowable consistency for minimum 30 minutes minimum when tested in accordance with ASTM C827.
- E. Properties: Certified to maintain initial placement volume or expand after set and meet the following minimum properties when tested in accordance with CRD-C621, for Grades B and C non-shrink grout:

Property	Test	Time	Result

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Setting Time	ASTM C191	Initial	2 hours (approximate)
		Final	3 hours (approximate)
Expansion			0.10% - 0.4% Maximum
Compressive Strength	CRD-C621	1 day	4,000 psi
		7 days	7,000 psi
		28 days	8,000 psi

2.3 FORMWORK

- A. Refer to Section 03 30 00 – Cast-In-Place Concrete for formwork requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify areas to receive grout.

1. Concrete to be grouted against should be a minimum of 7 days old.

- B. Surfaces to be grouted against should be free from dirt, mud, dust, oil, grease, wax, curing compound, bond breaker, laitance and/or unsound material, loose or non-adherent rust, loose mill scale, paint/primer, and any foreign matter or coating that adversely affects the bonding capacity to the surfaces.

3.2 PREPARATION

- A. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by brushing, hammering, chipping or other similar means until sound, clean concrete surface is achieved.

- B. Roughen concrete to a minimum of 1/4-inch amplitude, but not enough to interfere with placement of grout.

- C. Remove foreign materials from metal surfaces in contact with grout.

- D. Align, level and maintain final positioning of components to be grouted.

- E. Saturate concrete surfaces with clean water; remove excess water, leave none standing.

- F. Protect exposed/finish surfaces against splattering grout.

- G. Form Construction Preparation:

1. Vent grout space to eliminate air pockets.

2. Forms should be of sound and sufficiently strong material.

3. Forms should be sufficiently tight to prevent leakage of grout.

4. Forms should be adequately braced and tied together.

5. Forms should extend 1 inch minimum above bottom of baseplates.

H. Field-Mixed Sand-Cement Grout:

1. Roughen concrete surface to be grouted and remove laitance, foreign matter, curing compound, and loose particles.

2. For at least 6 hours before placing grout, saturate with water all concrete surfaces to be in contact with grout but standing water should not be permitted on the surfaces.

3. Remove excess water from anchor bolt holes and surfaces to be grouted and ensure surfaces are damp only, with no surface water, just before placing grout.

3.3 INSTALLATION – FORMWORK

A. Construct leak proof forms anchored and shored to withstand grout pressures.

B. Install formwork with clearances to permit proper placement of grout. Forms should extend 1 inch minimum above bottom of baseplates.

C. Exposed corners/edges should be beveled with 3/4-inch by 3/4-inch chamfer strips.

D. Vent grout space to eliminate air pockets.

3.4 MIXING

A. Portland Cement Grout:

1. Use proportions of 2 parts sand and 1 part cement, measured by volume.

2. Prepare grout with water to obtain consistency to permit placing and packing.

3. Mix water and grout in two steps; pre-mix using approximately 2/3 of water; after partial mixing, add remaining water to bring mix to desired placement consistency and continue mixing 2 to 3 minutes.

4. Mix only quantities of grout capable of being placed within 30 minutes after mixing.

5. Do not add additional water after grout has been mixed.

B. Mix and prepare non-shrink cementitious grout in accordance with manufacturer's instructions.

C. Mix grout components in proximity to work area and transport mixture quickly and in manner not permitting segregation of materials.

3.5 PLACING GROUT

A. Place Portland cement grout in accordance with ACI 301. Place cementitious grout in accordance with the manufacturer's instructions.

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- B. Place grout material quickly and continuously. Grout should not be retempered after initial mixing.
- C. Do not use pneumatic-pressure or dry-packing methods. Grout should be placed with a flowable or plastic consistency as best suits the situation. Grout with a plastic consistency should be consolidated every 3 inches minimum.
- D. Apply grout from one side only to avoid entrapping air and material segregation.
- E. Do not vibrate placed grout mixture, or permit placement when area is being vibrated by nearby equipment.
- F. Thoroughly compact final installation and eliminate air pockets. Compact grout by rodding; do not vibrate.
- G. Do not remove leveling shims for at least 48 hours after grout has been placed. If shims are removed or leveling nut or leveling screws are backed off, provide adequate constructability by greasing them, providing sufficient accessibility and other requirements for constructability.
- H. Extend grout on open sides of baseplates a minimum distance equal to the thickness of the grout section.
- I. Unplaced grout that has taken its initial set, has been retempered, has been contaminated by foreign materials, or has fallen on the ground should not be placed.

3.6 CURING

- A. Immediately after placement, protect grout from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. After grout has attained its initial set, keep damp for minimum of 3 days.

3.7 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with ACI 318.
- B. Submit proposed mix design of each class of grout to inspection and testing firm for review prior to commencement of Work.
- C. Tests of grout components may be performed to ensure conformance with specified requirements.
- D. Sampling of grout, making and curing of grout prisms for compressive strength tests, and testing of compressive strength specimens should be in accordance with the applicable provisions of ASTM C109.
- E. One sample of grout for compressive strength tests should be taken for every 25 cubic feet or fraction thereof of grout placed each day.
- F. Four standard 2-inch by 2-inch by 2-inch prisms should be made at each sampling.

- G. Compressive strength tests should be made at 3 days using one prism and at 7 days using two prisms. The fourth prism should be tested at 28 days only if the 7-day tests are below the specified strength.

3.8 PROTECTION

- A. Grout should be protected from construction operations, mechanical disturbances, water flow, and the weather for a minimum of 3 days after placement.

3.9 FINISHING

- A. Forms should not be removed until the grout has taken its initial set, but not less than 2 hours after grout placement.

- B. Exposed grout surfaces should have a smooth form or troweled finish.

3.10 CLEANING

- A. Clean grout splatter from exposed/finish surfaces. Cleaned surfaces should be equal to the original surface and should not be visible.

3.11 SHIM AND WEDGE REMOVAL

- A. After grout has gained sufficient strength to not be damaged, remove shims and wedges from under bases of equipment.

- B. After grout has gained sufficient strength to not be damaged, remove shims and wedges from under column base plates and bearing devices for structural work where they are supported by piers or walls.

- C. Patch voids with same type of grout.

3.12 LEVELING NUT OR LEVELING SCREW BACK-OFF

- A. After grout has gained sufficient strength to not be damaged, back off leveling nuts or leveling screws under bases of equipment such that they do not bear on concrete or steel.

- B. After grout has gained sufficient strength to not be damaged, back off leveling nuts or leveling screws under bearing devices for structural work where they are supported by piers or walls.

- C. Patch voids with same type of grout.

3.13 SUBMITTAL SCHEDULE

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ITEM NO.	SUBMITTAL REQUIREMENT	WITH BID	AS INDICATED
03 60 00-1	Product Data: Submit product data on grout.		2 weeks prior to fabrication or purchase
03 60 00-2	Manufacturer's Installation Instructions: Submit manufacturer's instructions for mixing, handling, surface preparation and placing grouts.		2 weeks prior to fabrication or purchase
03 60 00-3	Manufacturer's Certificate: Certify Products meet or exceed specified requirements.		

1

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural shapes.
2. Channels and angles.
3. Hollow structural sections.
4. Structural plates and bars.
5. Fasteners, connectors, and anchors.
6. Grout.

B. Related Sections:

1. Section 05 21 00 - Steel Joist Framing.
2. Section 05 31 23 - Steel Roof Decking: Support framing for small openings in roof deck.
3. Section 05 50 00 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.2 REFERENCES

A. American Institute of Steel Construction:

1. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.
2. AISC 341 - Seismic Provisions for Structural Steel Buildings.
3. AISC 360 - Specification for Structural Steel Buildings.

B. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
3. ASTM A108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

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- 1 4. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized)
2 Coatings on Iron and Steel Products.
- 3 5. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron
4 and Steel Hardware.
- 5 6. ASTM A193/A193M - Standard Specification for Alloy-Steel and Stainless Steel
6 Bolting Materials for High-Temperature Service.
- 7 7. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000
8 PSI Tensile Strength.
- 9 8. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated,
10 120/105 ksi Minimum Tensile Strength.
- 11 9. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel
12 Bolts, Studs, and Other Externally Threaded Fasteners.
- 13 10. ASTM A449 - Standard Specification for Quenched and Tempered Steel Bolts and
14 Studs.
- 15 11. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat
16 Treated, 150 ksi Minimum Tensile Strength.
- 17 12. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and
18 Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- 19 13. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless
20 Carbon Steel Structural Tubing.
- 21 14. ASTM A514/A514M - Standard Specification for High-Yield-Strength, Quenched
22 and Tempered Alloy Steel Plate, Suitable for Welding.
- 23 15. ASTM A529/A529M - Standard Specification for High-Strength Carbon-
24 Manganese Steel of Structural Quality.
- 25 16. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
- 26 17. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy
27 Columbium-Vanadium Structural Steel.
- 28 18. ASTM A588/A588M - Standard Specification for High-Strength Low-Alloy
29 Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4-in. (100-mm)
30 Thick.
- 31 19. ASTM A618/A618M - Standard Specification for Hot-Formed Welded and
32 Seamless High-Strength Low-Alloy Structural Tubing.
- 33 20. ASTM A786/A786M - Standard Specification for Hot-Rolled Carbon, Low-Alloy,
34 High-Strength Low-Alloy, and Alloy Steel Floor Plates.

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- 1 21. ASTM A847/A847M - Standard Specification for Cold-Formed Welded and
2 Seamless High Strength, Low Alloy Structural Tubing with Improved
3 Atmospheric Corrosion Resistance.
- 4 22. ASTM A852/A852M - Standard Specification for Quenched and Tempered Low-
5 Alloy Structural Steel Plate with 70 ksi (485 MPa) Minimum Yield Strength to 4
6 in. (100 mm) Thick.
- 7 23. ASTM A913/A913M - Standard Specification for High-Strength Low-Alloy Steel
8 Shapes of Structural Quality, Produced by Quenching and Self-Tempering Process
9 (QST).
- 10 24. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
- 11 25. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically
12 Deposited on Iron and Steel.
- 13 26. ASTM E94 - Standard Guide for Radiographic Examination.
- 14 27. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of
15 Weldments.
- 16 28. ASTM E165 - Standard Test Method for Liquid Penetrant Examination.
- 17 29. ASTM E709 - Standard Guide for Magnetic Particle Examination.
- 18 30. ASTM F436 - Standard Specification for Hardened Steel Washers.
- 19 31. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct
20 Tension Indicators for Use with Structural Fasteners.
- 21 32. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-
22 ksi Yield Strength.
- 23 33. ASTM F1852 - Standard Specification for Twist Off Type Tension Control
24 Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi
25 Minimum Tensile Strength.
- 26 C. American Welding Society:
27 1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive
28 Examination.
29 2. AWS D1.1 - Structural Welding Code - Steel.
- 30 D. Green Seal:
31 1. GC-03 - Anti-Corrosive Paints.
- 32 E. Research Council on Structural Connections:

1. RCSC - Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

F. SSPC: The Society for Protective Coatings:

1. SSPC - Steel Structures Painting Manual.
2. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
3. SSPC SP 3 - Power Tool Cleaning.
4. SSPC SP 6 - Commercial Blast Cleaning.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings:

1. Indicate sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Connections.
3. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

- C. Manufacturer's Mill Certificate: Certify products meet or exceed specified requirements.

- D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:

1. Structural Steel: AISC 303 ASIC 314 and AISC 360.
2. High Strength Bolted Connections: RCSC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.

1.6 QUALIFICATIONS

- A. Fabricator: Company specializing in performing Work of this section with minimum five years documented experience with the following current AISC Certification:

1. Standard Steel Building Structures (STD).

- B. Design connections not detailed on drawings under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Ohio.

- C. Erector: Company specializing in performing Work of this section with minimum five years documented experience
- D. Shop Painter: Company specializing in performing Work of this section with minimum five years documented experience
- E. Welders and Welding Procedures: AWS D1.1 qualified within previous 12 months.

1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work with the following:
 - 1. Section 05 21 00 and 05 31 23 for framed openings other than structural steel.
 - 2. Section 05 50 00 for miscellaneous steel supports other than structural steel.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL

- A. Structural W-Shapes and Channels: ASTM A992.
- B. Structural T-Shapes: Cut from structural W-shapes.
- C. Angles: ASTM A572 Grade 50.
- D. Round Hollow Structural Sections: ASTM A500, Grade C.
- E. Square and Rectangular Hollow Structural Sections: ASTM A500, Grade C.
- F. Structural Plates: ASTM A572 Grade 50.

2.2 FASTENERS, CONNECTORS, AND ANCHORS

- A. High Strength Bolts: ASTM A325; Type 1.
 - 1. Finish: Unfinished or mechanically galvanized where noted on plan.
- B. Nuts: ASTM A563 heavy hex type.
 - 1. Finish: Unfinished or mechanically galvanized where noted on plan.
- C. Washers: ASTM F436; Type 1, circular. Furnish clipped washers where space limitations require.
 - 1. Finish: Unfinished or mechanically galvanized where noted on plan.
- D. Anchor Rods: ASTM F1554; Grade 55, weldable.
 - 1. Shape: Hooked. or Straight as shown on plan.

- 1 2. Plate Washers: ASTM A36/A36M.
- 2 E. Threaded Rods: ASTM A36/A36M.
- 3 1. Finish: Unfinished. Mechanically galvanized where noted on plan.
- 4 2.3 WELDING MATERIALS
- 5 A. Welding Materials: AWS D1.1; type required for materials being welded.
- 6 2.4 ACCESSORIES
- 7 A. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate,
8 cement, water reducing and plasticizing additives, capable of developing minimum
9 compressive strength of 8,000 psi at 28 days.
- 10 B. Shop Primer: SSPC Paint 15, Type 1, red oxide.
- 11 C. Touch-Up Primer: Match shop primer.
- 12 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in
13 accordance with GC-03.
- 14 2.5 FABRICATION
- 15 A. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- 16 B. Fabricate connections for bolt, nut, and washer connectors.
- 17 C. Develop required camber for members.
- 18 2.6 FINISH
- 19 A. Prepare structural component surfaces in accordance with the following:
- 20 1. For members not exposed to view use: SSPC SP 3.
- 21 2. For exterior members exposed to the atmosphere use SSPC SP 6.
- 22 B. Shop prime structural steel members. Do not prime surfaces that will be field welded, in
23 contact with concrete, or high strength bolted.
- 24 C. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.
- 25 D. Galvanizing for Fasteners, Connectors, and Anchors:
- 26 1. Hot-Dipped Galvanizing: ASTM A153/A153M.
- 27 2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.
- 28 2.7 SOURCE QUALITY CONTROL AND TESTS

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Shop test bolted and welded connections as specified for field quality control tests.
- C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
 - 1. Specified shop tests are not required for Work performed by approved fabricator.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify bearing surfaces are at correct elevation.
- C. Verify anchor rods are set in correct locations and arrangements with correct exposure for steel attachment.

3.2 PREPARATION

- A. Furnish templates for installation of anchor rods and embedments in concrete and masonry work.

3.3 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- B. Field weld components indicated on Drawings.
- C. Field connect members with threaded fasteners; torque to required resistance tighten to snug tight for bearing type connections.
- D. Do not field cut or alter structural members without approval of Engineer.
- E. After erection, touch up welds and abrasions to match shop finishes.

3.4 GROUT INSTALLATION

- A. Shim bearing plates and equipment supports to proper elevation, snug tighten anchor bolts.
- B. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.
- C. Moist cure grout.
- D. Remove forms after grout is set. Trim grout edges to form smooth surface, splayed 45 degrees.

E. Tighten anchor bolts after grout has cured for a minimum of 3 days.

3.5 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements:
Field inspecting, testing, adjusting, and balancing.

B. Bolted Connections: Inspect in accordance with AISC 303.

1. Visually inspect all bolted connections.

C. Welding: Inspect welds in accordance with AWS D1.1.

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.

2. Visually inspect all welds.

3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.

4. Liquid Penetrant Inspection: ASTM E165.

5. Magnetic Particle Inspection: ASTM E709;

6. Radiographic Inspection: ASTM E94;

D. Correct defective bolted connections and welds.

END OF SECTION

SECTION 05 31 23

STEEL ROOF DECKING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel roof deck and accessories.
2. Framing for openings up to and including 10 inches.
3. Bearing plates and angles.

B. Related Sections:

1. Section 05 12 00 - Structural Steel Framing: Support framing for deck openings.

1.2 REFERENCES

A. American Society of Civil Engineers:

1. ASCE 3 - Standard Practice for the Construction and Inspection of Composite Slabs.

B. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
2. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable.

C. American Welding Society:

1. AWS D1.1 - Structural Welding Code - Steel.

D. Green Seal:

1. GC-03 - Anti-Corrosive Paints.

E. Steel Deck Institute:

1. SDI 29 - Design Manual for Composite Decks, Form Decks and Roof Decks.

F. SSPC: The Society for Protective Coatings:

1. SSPC Paint 15 - Steel Joist Shop Paint.

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate deck plan, support locations, Projections, openings and reinforcement, pertinent details, and accessories.

C. Product Data: Submit deck profile characteristics and dimensions, structural properties, and finishes.

D. Manufacturer's Installation Instructions: Submit manufacturer's installation instructions.

E. Manufacturer's Certificates: Certify Products meet or exceed specified requirements.

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

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with ASCE 3 for composite decks.

1.6 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

B. Design deck layout, spans, fastening, and joints, under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Ohio.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Cut plastic wrap to encourage ventilation.

C. Store deck on dry wood sleepers; slope for positive drainage.

PART 2 PRODUCTS

2.1 MATERIALS

A. Manufacturers:

1. United Steel Deck

2. Vulcraft Steel Deck

3. Canam Steel Deck

4. Substitutions: Section 01 60 00 - Product Requirements.

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- B. Sheet Steel: ASTM A653, Grade 33 Structural Quality; with G90 galvanized coating.
- C. Bearing Plates Angles: ASTM A572 Grade 50 steel, unfinished.
- D. Welding Materials: AWS D1.1.
- E. Shop Primer: SSPC Paint 15, Type 1, red oxide.
- F. Touch-Up Primer: Match shop primer.
- 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with GC-03.

2.2 ACCESSORIES

- A. Flute Closures: Closed cell foam rubber, 1 inch thick; profiled to fit tight to deck.
- B. Acoustical Insulation: Glass fiber type, minimum 1.1 lb/cu ft density; profiled to suit deck.
- C. Sump Pans, Sump Plates,; Fabricated of metal of same type and finish as deck.

2.3 FABRICATION

- A. Metal Deck: Sheet steel, configured as follows:
 - 1. Span Design: three or more.
 - 2. Minimum Metal Thickness Excluding Finish: 20 gage unless noted otherwise on plan
 - 3. Minimum Section Properties (per foot width): as noted on plan
 - 4. Nominal Height: 1-1/2 inch Wide ribbed deck or 3 inch type N deck as noted on plans.
 - 5. Formed Sheet Width: 24 or 36 inch.
- B. Corrugated Form Deck for support of concrete topping where noted on plan: Sheet steel, deformed ends for ventilation of concrete:
 - 1. Minimum Metal Thickness Excluding Finish: 0.358 inches or as noted on plan.
 - 2. Nominal Height: 1.3 inches or as noted on plan.
- C. Related Deck Accessories: Metal closure strips, wet concrete stops, cant strips, 20 gage thick sheet steel; of profile and size as indicated on drawings.
- D. Roof Sump Pan: Fabricate of 14 gage sheet steel, flat bottom, sloped sides, recessed 1-1/2 inches below roof deck surface, bearing flange 3 inches wide, sealed watertight.
- E. Fasteners: Galvanized hardened steel, self tapping.

F. Weld Washers: Mild steel, uncoated, 3/4 inch outside diameter, 1/8 inch thick.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

3.2 INSTALLATION

A. Erect metal deck in accordance with SDI Manual.

B. Bear deck on steel supports with 1-1/2 inch minimum bearing. Align and level.

C. Fasten ribbed deck to steel support members at ends and intermediate supports with mechanical fasteners at 12 inches oc maximum, parallel with deck flute and at each transverse flute.

D. Weld in accordance with AWS D1.1.

E. Mechanically fasten or weld male/female side laps at 18 inches oc maximum.

F. Reinforce steel deck openings from 6 to 18 inches in size with 2 x 2 x 1/4 inch steel angles. Place framing angles perpendicular to flutes; extend minimum two flutes beyond each side of opening and mechanically attach to deck at each flute.

G. Install 6 inch minimum wide sheet steel cover plates, of same thickness as deck, where deck changes direction. Mechanically attach 12 inches oc maximum.

H. Install wet concrete stops at roof edge upturned to top surface of slab to contain wet concrete. Install stops of sufficient strength to remain stationary under wet concrete without distortion.

I. Install sheet steel closures and angle flashings to close openings between deck and walls, columns, and openings.

J. Install double row of foam flute closures above walls and partitions perpendicular to deck flutes.

K. Position roof sump pans with flange bearing on top surface of deck. Fusion weld at each deck flute.

L. Place metal cantilever strips in position and mechanically attach.

M. Immediately after welding deck and other metal components in position, coat welds, burned areas, and damaged surface coating, with touch-up prime paint.

3.3 FIELD QUALITY CONTROL

A. Welding: Inspect welds in accordance with AWS D1.1.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes shop fabricated metal items.

1. Lintels.

2. Channel door frames.

3. Bollards.

4. Ladders.

5. Structural supports for miscellaneous attachments.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for embedded anchors and attachments for metal fabrications specified by this section in concrete.

2. Section 05 12 00 - Structural Steel Framing: Structural steel column anchor bolts.

3. Section 05 52 00 - Metal Railings.

4. Section 09 90 00 - Painting and Coating: Field applied paint finish.

1.2 REFERENCES

A. American National Standards Institute:

1. ANSI A14.3 - Ladders - Fixed - Safety Requirements

B. ASTM International:

1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

2. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

3. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

4. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

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- 1 5. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.
- 2 6. ASTM A297/A297M - Standard Specification for Steel Castings, Iron-Chromium
- 3 and Iron-Chromium-Nickel, Heat Resistant, for General Application.
- 4 7. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000
- 5 PSI Tensile Strength.
- 6 8. ASTM A312/A312M - Standard Specification for Seamless and Welded
- 7 Austenitic Stainless Steel Pipes.
- 8 9. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated,
- 9 120/105 ksi Minimum Tensile Strength.
- 10 10. ASTM A354 - Standard Specification for Quenched and Tempered Alloy Steel
- 11 Bolts, Studs, and Other Externally Threaded Fasteners.
- 12 11. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and
- 13 Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- 14 12. ASTM A501 - Standard Specification for Hot-Formed Welded and Seamless
- 15 Carbon Steel Structural Tubing.
- 16 13. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
- 17 14. ASTM A572/A572M - Standard Specification for High-Strength Low-Alloy
- 18 Columbium-Vanadium Structural Steel.
- 19 15. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated
- 20 (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- 21 16. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic
- 22 Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- 23 17. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
- 24 18. ASTM F436 - Standard Specification for Hardened Steel Washers.
- 25 19. ASTM F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-
- 26 ksi Yield Strength.
- 27 C. American Welding Society:
- 28 1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive
- 29 Examination.
- 30 2. AWS D1.1 - Structural Welding Code - Steel.
- 31 3. AWS D1.6 - Structural Welding Code - Stainless Steel.
- 32 D. Green Seal:

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1. GC-3 - Environmental Criteria for Anti-Corrosive Paints.
- E. National Ornamental & Miscellaneous Metals Association:
 1. NOMMA Guideline 1 - Joint Finishes.
- F. SSPC: The Society for Protective Coatings:
 1. SSPC - Steel Structures Painting Manual.
 2. SSPC SP 1 - Solvent Cleaning.
 3. SSPC SP 10 - Near-White Blast Cleaning.
 4. SSPC Paint 15 - Steel Joist Shop Paint.
 5. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
- G. U.S. Green Building Council:
 1. LEED Reference Guide for Green Building Design and Construction, 2009 Edition

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld lengths.
- C. Submit design calculations prepared by a licensed professional engineer in the state of Ohio for all connections of ladders & ladder components to structure & each other.
- D. Samples: Submit two 4 x 4 inch in size illustrating factory finishes.
- E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

1.5 QUALITY ASSURANCE

- A. Finish joints in accordance with NOMMA Guideline 1.
- C. Perform Work in accordance with City of Columbus standards.
- D. Maintain one copy of each document on site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept metal fabrications on site in labeled shipments. Inspect for damage.

C. Protect metal fabrications from damage by exposure to weather.

1.7 FIELD MEASUREMENTS

A. Verify field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MATERIALS - STEEL

A. Structural W-Shapes: ASTM A992.

B. Structural Shapes: ASTM A572 Grade 50.

C. Channels: ASTM A992/A992M

D. Steel Plate and Angles: ASTM A572 Grade 50

E. Hollow Structural Sections: ASTM A500/A500M, Grade C.

F. Steel Pipe: ASTM A53/A53M, Grade B, Schedule 40.

G. Sheet Steel: ASTM A653/A653M, Grade 33 Structural Quality, galvanized.

H. Bolts: ASTM A325.

1. Finish: Hot dipped galvanized.

I. Anchor Rods: ASTM F1554 Grade 55.

1. Finish: Hot dipped galvanized.

J. Nuts: ASTM A563 heavy hex type.

1. Finish: Hot dipped galvanized.

K. Washers: ASTM F436; Type 1.

1. Finish: Hot dipped galvanized.

L. Welding Materials: AWS D1.1; type required for materials being welded.

M. Shop Primer: SSPC Paint 15, Type 1, red oxide.

N. Touch-Up Primer: Match shop primer.

1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with Green Seal GC-03.

2. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with Green Seal GC-03.

2.2 MATERIALS - STAINLESS STEEL

- A. Bolts, Nuts, and Washers: ASTM A354.
- B. Welding Materials: AWS D1.6; type required for materials being welded.

2.4 LINTELS

- A. Lintels: Steel sections, size and configuration as indicated on Drawings, length to allow 8 inches minimum bearing on both sides of opening.
 - 1. Exterior Locations: Galvanized
 - 2. Interior Locations: Prime paint, one coat.

2.5 DOOR FRAMES

- A. Door Frames: Steel channel angle sections, size indicated on Drawings, with jamb anchors suitable for building into masonry or attachment to concrete, minimum 4 anchors per jamb; prime paint, one coat.

2.6 BOLLARDS

- A. Bollards: Steel pipe, concrete filled, crowned cap, 6 inches diameter, length as indicated on Drawings; prime paint, one coat.
- B. Concrete Fill: 3,000 psi as specified in Section 03 30 00.
- C. Anchors: Concealed type as indicated on Drawings.

2.7 LADDERS

- A. Ladder: ANSI A14.3, Steel welded construction:
 - 1. Bar Rails: 3/8 x 2 1/2 inches.
 - 2. Angle Rails: 3/8 x 2 1/2 x 2 1/2 inches
 - 2. Rungs: 3/4 inch diameter solid rod spaced 10 inches minimum to 14 inches maximum on center.
 - 3. Mounting: Space rungs 7 inches from wall surface to closest edge of rung; with steel mounting brackets and attachments.
 - 4. Finish: Prime paint, one coat.
- B. Ladder Safety Cage: Steel bar sections, minimum 1/4 x 2 inches.
 - 1. Bottom hoop 18 inches radius maximum 74 inches above finished floor.
 - 2. Other hoops 14 inches radius spaced maximum 48 inches on center.

3 Vertical bars spaced 10 inches on center.

4 Finish: Match ladder finish. Ladder attachments to concrete wall or steel structure
5 shall be by ladder supplier. See Architectural drawings for locations.

2.8 STRUCTURAL SUPPORTS

A. Joist Hangers: Joist strap anchors, galvanized.

B. Other Structural Supports: Steel sections, shape and size required to support applied loads
with maximum deflection of 1/240 of the span; prime paint, one coat.

2.9 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by continuous welds.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints
butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located;
consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related
components of same material and finish as fabrication, except where specifically noted
otherwise.

2.10 FACTORY APPLIED FINISHES - STEEL

A. Prepare surfaces to be primed in accordance with SSPC SP 2.

B. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

C. Do not prime surfaces in direct contact with concrete or where field welding is required.

D. Prime paint items with one coat except where galvanizing is specified.

E. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.

F. Galvanizing for Fasteners, Connectors, and Anchors:

1. Hot-Dipped Galvanizing: ASTM A153/A153M.

2. Mechanical Galvanizing: ASTM B695; Class 50 minimum.

2.12 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify field conditions are acceptable and are ready to receive Work.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal and aluminum where site welding is required.
- B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Make provisions for erection stresses. Install temporary bracing to maintain alignment, until permanent bracing and attachments are installed.
- C. Field weld components indicated on shop drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Obtain approval of Architect/Engineer prior to site cutting or making adjustments not scheduled.
- F. After erection, touch up welds, abrasions, and damaged finishes with prime paint or galvanizing repair paint to match shop finishes.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Plumb: ¼ inch per story or for every 12 ft in height whichever is greater, non-cumulative.
- C. Maximum Offset From Alignment: ¼ inch.
- D. Maximum Out-of-Position: ¼ inch.

- 1 3.5 FIELD QUALITY CONTROL

2 A. Welding: Inspect welds in accordance with AWS D1.1.

3 END OF SECTION

SECTION 05 52 00

METAL RAILINGS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes steel pipe railings, balusters, and fittings; and handrails:

1. Section 03 30 00 - Cast-In-Place Concrete: Execution requirements for placement of anchors specified in this section in concrete.
2. Section 09 90 00 - Painting and Coating: Paint finish.

1.2 REFERENCES

A. American Architectural Manufacturers Association:

1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
2. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. ASTM International:

1. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
4. ASTM A513 - Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
5. ASTM B211 - Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire.
6. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
7. ASTM B483/B483M - Standard Specification for Aluminum and Aluminum-Alloy Drawn Tubes for General Purpose Applications.

C. Green Seal:

1. GC-3 - Environmental Criteria for Anti-Corrosive Paints.

D. National Ornamental & Miscellaneous Metals Association:

1. NOMMA Guideline 1 - Joint Finishes.

E. SSPC: The Society for Protective Coatings:

1. SSPC - Steel Structures Painting Manual.

2. SSPC Paint 20 - Zinc-Rich Coating, Type I - Inorganic and Type II - Organic.

F. U.S. Green Building Council:

1. LEED Reference Guide for Green Building Design and Construction, 2009 Edition

1.3 DESIGN REQUIREMENTS

A. Design handrail, guardrail, and attachments to resist forces as required by 2007 Ohio Building Code. Apply loads non-simultaneously to produce maximum stresses.

1. Guard Top Rail and Handrail Concentrated Load: 200 pounds applied at any point in any direction.

2. Guard Top Rail Uniform Load: 50 pounds per linear foot applied in any direction.

3. Intermediate Rails, Panels, and Baluster Concentrated Load: 50 pounds applied to 1 sf area.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal requirements.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

C. Submit design calculations prepared by a licensed professional engineer in the state of Ohio for all railing components & connections.

1.6 QUALITY ASSURANCE

A. Perform Work for structural aluminum in accordance with AA ADM 1 and AA ASM 35.

B. Finish joints in accordance with NOMMA Guideline 1.

D. Perform Work in accordance with State of Ohio standard.

E. Maintain one copy of each document on site.

1.7 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 STEEL RAILING SYSTEM COMPONENTS

- A. Rails and Posts: 1 1/2 inch outside diameter steel pipe; welded joints.
- B. Fittings: Elbows, T-shapes, wall brackets, escutcheons; cast steel.
- C. Mounting: brackets and flanges, with steel inserts for casting in concrete and with steel brackets for embedding in masonry. Prepare backing plate for mounting in wall construction.
- D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.
- E. Splice Connectors: Steel concealed spigots.
- F. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.
- G. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic zinc rich.
 - 1. Interior Anti-Corrosive Paints: Maximum volatile organic compound content in accordance with Green Seal GC-3.

2.2 FABRICATION

- A. Fit and shop assemble components in largest practical sizes for delivery to site.
- B. Fabricate components with joints tightly fitted and secured. Furnish spigots and sleeves to accommodate site assembly and installation.
- C. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- E. Exterior Components: Continuously seal joined pieces by continuous welds. Drill condensate drainage holes at bottom of members at locations not encouraging water intrusion.
- F. Interior Components: Continuously seal joined pieces by continuous welds.
- G. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- H. Accurately form components to each other and to building structure.
- I. Accommodate for expansion and contraction of members and building movement without damage to connections or members.

PART 3 EXECUTION

3.1 EXAMINATION

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1 A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

2 B. Verify field conditions are acceptable and are ready to receive work.

3 C. Verify concealed blocking and reinforcement is installed and correctly located to receive
4 wall mounted handrails.

5 3.2 PREPARATION

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

7 B. Supply items required to be cast into concrete and embedded in masonry with setting
8 templates, to appropriate sections.

9 3.3 INSTALLATION

10 A. Install components plumb and level, accurately fitted, free from distortion or defects.

11 B. Anchor railings to structure with anchors.

12 C. Field weld anchors as indicated on shop drawings. Touch-up welds with primer. Grind
13 welds smooth.

14 D. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk
15 fastenings.

16 E. Install Work in accordance with State of Ohio standards.

17 3.4 ERECTION TOLERANCES

18 A. Section 01 40 00 - Quality Requirements: Tolerances.

19 B. Maximum Variation From Plumb: ¼ inch per story, non-cumulative

20 C. Maximum Offset From Alignment: ¼ inch.

21 D. Maximum Out-of-Position: ¼ inch.

22 END OF SECTION

SECTION 06 10 53

ROUGH CARPENTRY

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. Wood blocking and nailers.
2. Wood furring and grounds.
3. Plywood backing panels.
4. Sheathing and Roof Sheathing

1.3 DEFINITIONS

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

- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. RIS: Redwood Inspection Service.
4. SPIB: The Southern Pine Inspection Bureau.
5. WCLIB: West Coast Lumber Inspection Bureau.
6. WWPA: Western Wood Products Association.

1.4 ACTION 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. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship

1. Dimension lumber framing.
2. Miscellaneous lumber.

- B. 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.

- C. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Furring.

- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species

1. Hem-fir (north); NLGA.
2. Mixed southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
6. Western woods; WCLIB or WWPA.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

C. For concealed boards, provide lumber with 15percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine; No. 2 grade; SPIB.
2. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
4. Eastern softwoods; No. [2] [3] Common grade; NeLMA.
5. Northern species; No. [2] [3] Common grade; NLGA.
6. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

D. 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.

E. 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.

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.3 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, Exterior, AC in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

1. Plywood shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 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.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- 1 A. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring
2 backing panels.
- 3 B. Provide blocking and framing as indicated and as required to support facing materials, fixtures,
4 specialty items, and trim.
- 5 1. Provide metal clips for fastening gypsum board or lath at corners and intersections
6 where framing or blocking does not provide a surface for fastening edges of panels.
7 Space clips not more than 16 inches o.c.
- 8 C. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated,
9 complying with the following:
- 10 1. NES NER-272 for power-driven fasteners.
11 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
12 3. Table R602.3(1), "Fastener Schedule for Structural Members," and
13 Table R602.3(2), "Alternate Attachments," in ICC's International Residential
14 Code for One- and Two-Family Dwellings.
- 15 D. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully
16 penetrate members where opposite side will be exposed to view or will receive finish materials.
17 Make tight connections between members. Install fasteners without splitting wood. Drive nails
18 snug but do not countersink nail heads unless otherwise indicated.

19 3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- 20 A. Install where indicated and where required for attaching other work. Form to shapes indicated
21 and cut as required for true line and level of attached work. Coordinate locations with other work
22 involved.
- 23 B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces
24 unless otherwise indicated.
- 25 C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous
26 flexible flashing separator between wood and metal decking.
- 27 D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not
28 less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness
29 of finish material. Remove temporary grounds when no longer required.

30 3.3 PROTECTION

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

37 END OF SECTION

SECTION 07 19 00

WATER REPELLENTS

PART 1 GENERAL

1.1 SUMMARY

A. Section includes water repellent coating applied to concrete surfaces.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Concrete surfaces.

2. Section 04 20 00 –Unit Masonry

1.2 REFERENCES

A. ASTM International:

1. ASTM D1653 - Standard Test Method for Water Vapor Transmission of Organic Coating Films.

2. ASTM D5703 - Standard Practice for Preparatory Surface Cleaning for Clay Brick Masonry.

3. ASTM E514 - Standard Test Method for Water Penetration and Leakage Through Masonry.

4. ASTM G154 - Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials.

1.3 SYSTEM DESCRIPTION

A. Applied Penetrant: Material to restrict moisture absorption in material being treated as recommended by manufacturer for specific substrate.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Product Data: Submit details of product description, tests performed, limitations to coating, and chemical properties including percentage of solids.

C. Manufacturer's Installation Instructions: Submit special procedures and conditions requiring special attention, and cautionary procedures required during application.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with State of Ohio standard.

B. Maintain one copy each document on site.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Protect coating liquid from freezing.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not apply coating when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

C. Do not apply coating when wind velocity exceeds manufacturer recommendations.

1.10 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five-year manufacturer warranty for water repellents.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Siloxane Water Repellent: Siloxane penetrating type water repellent, with maximum 3.3 lb./gal. VOC content.

1. Moisture Vapor Transmission: Maximum 28.33 perms or 50% compared to untreated surfaces, ASTM D1653.

2. Resistance to Accelerated Weathering: No loss in repellency after 2,500 hours, ASTM G154.

3. Reduction of Leakage: Minimum 97 percent water penetration and leakage, ASTM E514.

4. Apply to clay brick, concrete masonry, and concrete.

B. Silicone Water Repellent: Silicone film-forming type water repellent, containing 3 to 5 percent solids by weight, with maximum 3.3 lb./gal. VOC content.

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1. Moisture Vapor Transmission: Maximum 28.33 perms or 50% compared to untreated surfaces, ASTM D1653.
2. Resistance to Accelerated Weathering: No loss in repellency after 2,500 hours, ASTM G154.
3. Apply to clay brick, concrete masonry, and concrete.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify joint sealants are installed and cured.
- C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of coating.

3.2 PREPARATION

- A. Delay Work until masonry mortar and concrete substrate is cured minimum of 60 days.
- B. Remove loose particles and foreign matter.
- C. Remove oil or foreign substance with chemical solvent which will not affect coating.
- D. Scrub and rinse surfaces with water and let dry.

3.3 APPLICATION

- A. Apply per manufacturers recommendations.
- B. Apply in one continuous, uniform coat.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect adjacent surfaces not scheduled to receive coating.
- C. When applied to unscheduled surfaces, remove immediately by methods as instructed by coating manufacturer.

END OF SECTION

SECTION 07 21 00

THERMAL INSULATION

PART 4 - GENERAL

4.1 RELATED DOCUMENTS

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

4.2 SUMMARY

- A. Section Includes:

1. Perimeter insulation under slabs-on-grade.
2. Vapor retarders for slab.

4.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

4.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

4.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

4.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

- B. Protect foam-plastic board insulation as follows:

1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 5 - PRODUCTS

5.1 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:

1. Basis of Design Manufacturer and Product:
 - a. Owens Corning. Foamular 150 XPS.
 2. Type X, 1.30 lb/cu. ft. 15 psi minimum.

- B. Foil-Faced, Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 1, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, based on tests performed on unfaced core on thicknesses up to 4 inches.

1. Basis of Design Manufacturer and Product:
 - a. Johns Mansville AP Foil Faced Polyisocyanurate Foam Sheathing.

- C. Samples for Verification: Full-size units for each type of exposed insulation indicated.

5.2 VAPOR RETARDERS

- A. Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than 25 lb/1000 sq. ft., with maximum permeance rating of 0.0507 perm.

1. Available Products:
 - a. Raven Industries Inc.; DURA-SKRIM 6WW.
 - b. Reef Industries, Inc.; Griffolyn T-65.

- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

5.3 AUXILIARY INSULATING MATERIALS

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.

- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

5.4 INSULATION FASTENERS

- A. Insulation fasteners as recommended by insulation manufacturer.

- B. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:

1. Available Products:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
 - c. Gemco; Spindle Type.

2. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 3. Spindle: Copper-coated, low carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.
- C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
- a. AGM Industries, Inc.; RC150.
 - b. AGM Industries, Inc.; SC150.
 - c. Gemco; Dome-Cap.
 - d. Gemco; R-150.
 - e. Gemco; S-150.
- D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
1. Available Products:
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Eckel Industries of Canada; Stic-Klip Type S Adhesive.
 - c. Gemco; Tuff Bond Hanger Adhesive.

PART 6 - EXECUTION

6.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

6.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

6.3 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of 36 inches below exterior grade line.

6.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

6.5 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
 1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
 2. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
 3. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- C. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

6.6 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 07 26 00

VAPOR RETARDERS

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes sheet and sealant materials for controlling vapor diffusion.

1.2 REFERENCES

- A. ASTM International:

1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
2. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

- B. Green Seal:

1. GS-36 - Aerosol Adhesives.

- C. Sealant, Waterproofing and Restoration Institute:

1. SWRI - Sealant Specification.

- D. South Coast Air Quality Management District:

1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

- E. U.S. Green Building Council:

1. LEED Reference Guide for Green Building Design and Construction, 2009 Edition

1.3 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96/E96M, desiccant method.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

- B. Product Data: Submit data indicating material characteristics, performance criteria, and limitations.

- C. Manufacturer's Installation Instructions: Submit preparation and installation requirements, techniques.

1.6 QUALITY ASSURANCE

1 A. Perform Work in accordance with SWRI - Sealant and Caulking Guide Specification
2 requirements for materials and installation.

3 B. Perform Work in accordance with State of Ohio standard.

4 PART 2 PRODUCTS

5 2.1 VAPOR RETARDERS

6 A. Sheet Retarder Type 1: Clear polyethylene film for above grade application, 10 mil thick.

7 B. Butyl Sealant Type A: ASTM C920, butyl rubber base, single component, solvent release,
8 non-skinning; black color.

9 1. Elongation Capability: 5 percent.

10 2. Service Temperature Range: -40 to 180 degrees F.

11 3. Shore A Hardness Range: 10 to 30.

12 4. Interior Sealants and Sealant Primers: Maximum volatile organic compound
13 content in accordance with SCAQMD Rule 1168.

14 C. Polysulfide Sealant Type B: ASTM C920, single component, chemical curing, capable of
15 continuous water immersion, non-sagging type; black color.

16 1. Elongation Capability: 25 percent.

17 2. Service Temperature Range: -40 to 180 degrees F.

18 3. Shore A Hardness Range: 20 to 35.

19 4. Interior Sealants and Sealant Primers: Maximum volatile organic compound
20 content in accordance with SCAQMD Rule 1168.

21 D. Polyurethane Sealant Type C: ASTM C920, single component, chemical curing, non-
22 sagging; black color.

23 1. Elongation Capability: 25 percent.

24 2. Service Temperature Range: -40 to 180 degrees F.

25 3. Shore A Hardness Range: 20 to 35.

26 4. Interior Sealants and Sealant Primers: Maximum volatile organic compound
27 content in accordance with SCAQMD Rule 1168.

28 E. Sealant: Type specified in Section 07 90 00.

29 F. Primer and Backer Rods: Recommended by sealant manufacturer to suit application.

1. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

G. Cleaner: Non-corrosive type; recommended by sealant manufacturer; compatible with adjacent materials.

H. Mastic Adhesive Type 1: asphalt type, compatible with sheet retarder and substrate, thick mastic of uniform consistency.

1. Interior Adhesives: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

2. Interior Aerosol Adhesives: Maximum volatile organic compound content in accordance with GS-36.

I. Adhesive Type 2: Compatible with sheet retarder and substrate, permanently non-curing.

1. Interior Adhesives: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

2. Interior Aerosol Adhesives: Maximum volatile organic compound content in accordance with GS-36.

2.2 ACCESSORIES

A. Thinner and Cleaner for Butyl Sheet: As recommended by sheet material manufacturer.

B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide, compatible with sheet material.

C. Attachments: Galvanized steel bars and anchors.

PART 3 EXECUTION

3.1 PREPARATION

A. Remove loose or foreign matter capable of impairing adhesion.

B. Clean and prime substrate surfaces to receive adhesive and sealants.

3.2 EXISTING WORK

A. Clean and repair existing construction to provide positive and continuous seal for vapor retarders.

3.3 INSTALLATION

A. Vapor Retarder For Solid Substrate: Secure sheet retarder to solid construction with adhesive. Lap edges and ends 6 inches and adhesive seal to ensure complete and continuous seal.

B. Install Work in accordance with applicable State of Ohio standards.

END OF SECTION

SECTION 07 42 13

METAL WALL PANELS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Section includes preformed non-insulated metal siding system with liner and soffits, Insulated metal panel system with subgirts, Insulated panel system with liner, subgirts, related flashings and accessory components.

B. Accessories including fasteners and perimeter trim.

1.2 REFERENCES

A. American Architectural Manufacturers Association (AAMA)

1. AAMA 501.1: Standard Test Method for Metal Curtain Walls for water penetration using Dynamic Pressure.
2. AAMA 501.2: Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls and Sloped Glazing Systems.

B. American Society of Civil Engineers (ASCE)

1. ASCE 7: Minimum Design Loads for Buildings and Other Structures.

C. ASTM International

1. ASTM A480: Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet and Strip.
2. ASTM A653: Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
3. ASTM A755: Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
4. ASTM A792: Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
5. ASTM A924: Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
6. ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus
7. ASTM B209: Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
8. ASTM C273: Standard Test Method for Shear Properties of Sandwich Core Materials.
9. ASTM C518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
10. ASTM D522: Standard Test Methods for Mandrel Bend Test of Attached Organic Coatings
11. ASTM D523: Standard Test Method for Specular Gloss
12. ASTM D714: Standard Test Method for Evaluating Degree of Blistering of Paints

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13. ASTM D968: Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
14. ASTM D1308: Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes
15. ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics
16. ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics
17. ASTM D1623: Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
18. ASTM D1929: Standard Test Method for Determining Ignition Temperature of Plastics
19. ASTM D2126: Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
20. ASTM D2244: Standard practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
21. ASTM D2247: Standard Practice for Testing Water Resistance of Coatings in 100 percent Relative Humidity
22. ASTM D2794: Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
23. ASTM D3273: Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
24. ASTM D3359: Standard Test Methods for Measuring Adhesion by Tape Test
25. ASTM D3363: Standard Test Method for Film Hardness by Pencil Test
26. ASTM D4145: Standard Test Method for Coating Flexibility of Prepainted Sheet
27. ASTM D4214: Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films
28. ASTM D5894: Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV Condensation Cabinet)
29. ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
30. ASTM E72: Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
31. ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials
32. ASTM E90: Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
33. ASTM E283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
34. ASTM E330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
35. ASTM E331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
36. ASTM G153: Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
37. ASTM G154: Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
38. ASTM E1354: Standard Test Method for Heat and Visible Smoke Release Rates

- D. International Building Code (IBC): current edition
 - E. National Fire Protection Agency (NFPA)
 - 1. NFPA 259: Standard Test Method for Potential Heat of Building Materials.
 - 2. NFPA 285: Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
 - F. International Organization for Standardization (ISO)
 - 1. ISO 14025: Environmental Labels and Declarations
- 1.3 ADMINISTRATIVE REQUIREMENTS
- A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to insulated wall panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.
- 1.4 SUBMITTALS
- A. Refer to Section 013300 Submittal Procedures.
 - B. Product Data: Submit manufacturer current technical literature for each type of product.
 - C. Shop Drawings: Submit detailed drawings and panel analysis showing:
 - 1. Profile
 - 2. Gauge of both exterior and interior sheet
 - 3. Location, layout and dimensions of panels
 - 4. Location and type of fasteners
 - 5. Shape and method of attachment of all trim
 - 6. Locations and type of sealants
 - 7. Installation sequence
 - 8. Coordination Drawings: Provide elevation drawings and building sections which show panels in relationship to required locations for structural support. Include panel details and details showing attachment to structural support.
 - 9. Other details as may be required for a weathertight installation
 - D. Panel Analysis: Provide panel calculations to verify panels will withstand the design wind loads indicated without detrimental effects or deflection exceeding L/180. Include effects of thermal differential between the exterior and interior panel facings and resistance to fastener pullout.
 - E. Samples: Provide nominal 3 x 5 inch of each color indicated.
 - F. Quality Assurance Submittals
 - 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.

2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications:

1. Manufacturer shall have a minimum of five (5) years' experience in the production of insulated wall panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.
2. Manufacturer to be registered with a Program Operator with a Certified, Environmental Product Declaration, in conformance with ISO 14025, for Insulated Metal Panels.

- ##### B. Installer Qualifications:
- Authorized by the manufacturer and the work shall be supervised by a person having a minimum of five (5) years' experience installing insulated wall panels on similar type and size projects.

1.6 DELIVERY, STORAGE AND HANDLING

- ##### A. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.
- ##### B. Store wall panel materials on dry, level, firm, and clean surface. Stack no more than two bundles high. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

1.7 WARRANTY

- ##### A. Limited Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance including bond integrity, deflection and buckling.

1. Warranty Period: Two (2) years from date of Substantial Completion, or 2 years and 6 months from the date of shipment from manufacturer's plant, whichever occurs first.

- ##### B. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess of 8 when tested in accordance with ASTM D4214, Method A, and /or color fading in excess of 5 ΔE Hunter units on panels when tested in accordance with ASTM D2244.

1. Warranty Period: Twenty (20) years from date of Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

- C. Thermal Warranty: Standard form in which manufacturer agrees to repair or replace panels that exhibit greater than 10% reduction from published material R-value at time of manufacture as measured in accordance with ASTM C518 within specified warranty period.

1. Warranty Period: Thirty (30) years from date of Substantial Completion or 30 years and 3 months from date of shipment from manufacturer's plant, whichever occurs first.

PART 2 – PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Liner panels shall be attached to building girts with zinc plated fasteners.
- B. Subgirts shall be attached to liner panels with zinc plated self-drilling fasteners.
- C. Wall panels shall be fastened to subgirts. Fasteners shall be concealed.

2.2 COMPONENTS

- A. Exterior Panel and Other Sheet Materials: Minimum 24 gage thick precoated steel Grade 40 structural steel with G90 hot dipped galvanized coating both conforming to ASTM A653 stock 0.024 inch thick precoated aluminum stock; profile as indicated on Drawings 1 ½" deep; 12" inches wide panel; 1" reveal; interlocking edges and concealed fasteners, fitted with continuous gaskets surface embossed.
1. Precoated Galvanized Steel: ASTM A755/A755M; G90; shop precoated with manufacturer's standard thermosetting coating. Exposed Exterior Surfaces: Color as selected by architect from manufacturer's standard range.
- B. Liner: depth as required for R value of insulation thickness; minimum 24 gage thick steel stock 0.024-inch-thick aluminum stock; vertical smooth profile 24" inch wide panels; interlocking edges, manufacturer's standard edge condition.
1. Galvanized Steel: ASTM A653/A653M, Grade D, Coating Designation G90. Precoated Surfaces: Color as selected by architect from manufacturer's standard range.
- C. Soffit Panels: 24 gage thick pre-coated steel 0.024-inch-thick pre-coated aluminum alloy, 12-inch-wide panels; lapped edges fitted with continuous gaskets.
1. Galvanized Steel: ASTM A653/A653M, Grade D, Coating Designation G90. Precoated Surfaces: Color as selected by the architect from manufacturer's standard range.
- D. Miscellaneous Sheet Materials: Minimum 24 gage thick steel stock 0.024-inch-thick aluminum stock.
1. Galvanized Steel: ASTM A653/A653M, Grade D, Coating Designation G90. Precoated Surfaces: Color as selected by the architect from manufacturer's standard range. 30

- E. Subgirts: Steel profile as indicated on Drawings; to attach panel system to structural frame. Thickness as required to support specified loads within specified deflection limitations.
- F. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles. Mitered internal corners to be back braced with 22 gage thick pre-coated sheet stock to maintain continuity of profile.
- G. Expansion Joints: Same material, thickness and finish as exterior sheets; manufacturer's standard brake formed type, of profile to suit system. Exposed fasteners same finish as panel system.
- H. Trim, Closure Pieces, Caps, Flashings, Facias and Infills: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
- I. Anchors: Galvanized steel

2.3 ACCESSORIES

A. Fasteners:

- 1. Self-drilling fasteners shall be corrosion resistant plated steel with neoprene washer, as recommended by manufacturer.
- 2. Material: Hex-head type with steel and neoprene washer and 12-gauge stainless steel clip supplied by the manufacturer.
- 3. Size: As recommended by manufacturer.

B. Perimeter Trim:

- 1. Fabricated perimeter trim and metal flashing: Shall be same gauge, material and coating color as exterior face of insulated metal wall panel.
- 2. Extruded perimeter trim: Shall be extruded aluminum 6063-T5 alloy with spray applied PVF coating in same color as exterior face of insulated metal wall panel.

C. Sealants: Butyl, non-skinning/curing type as recommended by manufacturer.

D. Butyl Tape: As recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Provide field measurements to manufacturer as required to achieve proper fit of the preformed wall panel envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.
- B. Supporting Steel: All structural supports required for installation of panels shall be by others. The walls must be square, and support members to which panels are attached must be in the same plane (not lapped or nested), flat and free of obstructions such as weld marks, bolts or screw heads. Support members shall be installed within the following tolerances:
 - 1. Plus or minus 1/8 inch in 5 feet in any direction along plane of framing.

2. Plus or minus 1/4 inch cumulative in 20 feet in any direction along plane of framing.
3. Plus or minus 1/2 inch from framing plane on any elevation.
4. Plumb or level within 1/8 inch at all changes of transverse for pre-formed corner panel applications.
5. Verify that bearing support has been provided behind vertical joints of horizontal panel systems and horizontal joints of vertical panel systems. Width of support shall be as recommended by manufacturer.

- C. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.

3.2 PANEL INSTALLATION

- A. Installation shall be in accordance with manufacturer's installation guidelines and recommendations.
- B. Install panels plumb, level, and true-to-line to dimensions and layout indicated on approved shop drawings.
- C. Cut panels prior to installing, where indicated on shop drawings, using a power circular saw with fine tooth carbide tip blade per manufacturer's instructions. Personnel should wear respiratory and eye protection devices.
- D. Butyl Weather Barrier Sealant:
 1. Apply non-skinning butyl sealant as shown on shop drawings and manufacturer's installation instructions as necessary to establish the vapor barrier for the panels.
 2. Use non-skinning butyl tube sealant only for tight metal-to-metal contact.
 3. Do not use non-skinning butyl tube sealant to bridge gaps.
- E. Place panel fasteners through pre-punched holes in attachment clips, concealed within the joint of the panel. Secure units to the structural supports. Space clips as recommended by manufacturer or otherwise indicated on the approved shop drawings.

3.3 TRIM INSTALLATION

- A. Place trim and trim fasteners only as indicated per details on the approved shop drawings.
- B. Field drill weep holes where appropriate in horizontal trim; minimum 1/4 inch diameter at 24 inches on center.
- C. Place a continuous strip of butyl tube sealant between the inside back face of closure trims and interior panel faces for proper vapor seal.

3.4 SEALANT INSTALLATION FOR EXPOSED JOINTS

- A. Clean and prime surfaces to receive exterior exposed sealants in accordance with sealant manufacturer's recommendations.

1 B. Follow sealant manufacturer's recommendations for joint width-to-depth ratio, application
2 temperature range, size and type of backer rod, and compatibility of materials for adhesion.

3 C. Direct contact between butyl and silicone sealants shall not be permitted.

4 3.5 TRIM INSTALLATION

5 A. Place trim and trim fasteners only as indicated per details on the approved shop drawings.

6 B. Field drill weep holes where appropriate in horizontal trim where indicated on shop drawings.

7 C. Place a continuous strip of butyl tape or butyl sealant on closure trims for the length of the panel
8 to be covered as indicated on shop drawings.

9 3.6 CLEANING AND PROTECTION

10 A. Remove protective film immediately after installation.

11 B. Touch-up, repair or replace metal panels and trim that have been damaged.

12 C. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt,
13 and sealant.

14 END OF SECTION

SECTION 07 52 00

MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.1 SUMMARY

A. Section includes:

1. Modified bitumen membrane roofing with cap sheet.
2. Base flashings, roofing membrane expansion joints, cover board and Counterflashing.
3. Roof coating.

B. Related Sections:

1. Applicable provisions of Division 1 shall govern all work under this Section.
2. Section 06 10 53 - Miscellaneous Rough Carpentry: Wood Nailers and cant strips.
3. Section 07 62 00 - Sheet Metal Flashing and Trim: Weather protection for base flashings.

1.2 REFERENCES

A. ASTM International:

1. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
2. ASTM C726 - Standard Specification for Mineral Fiber Roof Insulation Board.
3. ASTM C728 - Standard Specification for Perlite Thermal Insulation Board.
4. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.
5. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
6. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers.
7. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer.
8. ASTM D41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.

B. FM Global:

1. FM Approval Guide.
2. FM DS 1-28 - Wind Loads to Roof Systems and Roof Deck Securement.
3. FM 4450 - Approval Standard for Class 1 Insulated Steel Deck Roofs.

C. Intertek Testing Services (Warnock Hersey Listed):

1. WH - Certification Listings.

D. National Roofing Contractors Association:

1. NRCA - The NRCA Roofing and Waterproofing Manual.

E. Single Ply Roofing Institute:

1. SPRI ES-1 - Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.

F. Underwriters Laboratories Inc.:

1. UL - Fire Resistance Directory.
2. UL 790 - Tests for Fire Resistance of Roof Covering Materials.
3. UL 1256 - Fire Test of Roof Deck Construction.
4. UL 1897 - Uplift Tests for Roof Covering Systems.

1.3 SYSTEM DESCRIPTION

A. Modified Bitumen Roofing System SBS System:

1. See section 07 21 13 for insulation values. Tapered insulation for saddles to drains.
2. ½ inch Fiber Board
3. Two plies, base and interply of SBS membrane glass reinforced Modified Bitumen mopped applied.
4. Cap Sheet – 160 mils, 180-gram polyester mat reinforced, granular surfaced SBS modified bitumen capsheet.

1.4 PERFORMANCE REQUIREMENTS

A. Conform to applicable code for roof assembly fire hazard requirements.

B. UL: Class A Fire Hazard Classification.

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- C. Roof Assembly Classification: FM Class 1 Construction, windstorm classification of 1-90, in accordance with FM Construction Bulletin 1-28.

1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedure: Submittal procedures.
- B. Shop Drawings: Indicate setting plan for tapered and non-tapered insulation, layout of seams, direction of laps, base flashing details.
- C. Product Data: Submit membrane materials, base flashing materials, insulation, cover board, and protective coating.
- D. Samples: Submit two sample 1 lb. (0.5 Kg) containers of roofing aggregate.
- E. Manufacturer's Installation Instructions: Submit special precautions required for seaming membrane.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- G. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures and wind velocity during application.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with NRCA Roofing and Waterproofing Manual.

1.8 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum five years documented experience approved by manufacturer.

1.9 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meetings.
- B. Convene minimum one week prior to commencing Work of this section.
- C. Review installation procedures and coordination required with related Work.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver products in manufacturer's original containers, dry, undamaged, seals and labels intact.
- C. Store products in weather protected environment, clear of ground and moisture.

D. Stand roll materials on end.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements.

B. Do not apply roofing membrane during inclement weather without proper weather protection.

C. Comply with manufacturer's recommendations for minimum and maximum temperatures and humidity during application.

D. Do not apply roofing membrane to damp or frozen deck surface.

E. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.

F. Consider effects of wind chill on adhesives, and ensure they will not prematurely set before proper adhesion takes place.

1.12 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate Work with installing associated metal flashings as work of this section proceeds.

1.13 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

1. Provide a thirty 30-year guarantee warranting all roofing and flashing required under contract, to be watertight and free from defects in materials or workmanship for period of time.

2. Membrane, insulation, shop fabricated and/or manufacturer fabricated metal flashing, wood blocking, premolded and/or factory supplied associated roof system products, their fasteners and/or all products used for adhesive and/or adherence purposes and sealants shall be covered by the manufacturer NDL ("No-Dollar-Limit") /" Total System" warranty.

3. Shop fabricated metal flashing materials specified in section 07 63 00 and herein or as required for a complete watertight system may be provided in lieu of manufacturer fabricated metal flashing and shall be covered in the manufacturer total system warranty specified.

4. Roofing Contractor shall perform work required using details provided within the specifications, on the drawings or as required by the manufacturer for a proper watertight installation and to allow issuance of warranties required herein. All components included in the roof system installed by the work required shall be included in the manufacturer watertight warranty for the duration of such warranty

required herein. System components required by the work but otherwise not warranted by the manufacturer shall be upgraded to be manufacturer specific products at the time of bid such that they are covered by the warranty required herein. Provide all equipment recommended by the manufacturer for proper installation of the materials specified.

PART 2 PRODUCTS

2.1 COMPONENTS

A. Base and Interply: Asphalt and polymer modifiers of styrene-butadiene-styrene (SBS) type, modified bituminous sheet, reinforced with non-woven fiber glass; smooth plies and base sheets and granule surfaced cap sheet.

B. Cap Ply Polyester reinforced with granular cap sheet. Plies shall be 90 mils.

1. Reflectance: Measured in accordance with ASTM E903, ASTM E1918, or ASTM C1549.

2. Emittance: Measured in accordance with ASTM E408 or ASTM C1371.

C. Bituminous Materials:

1. Asphalt Bitumen: ASTM D312, Type IV.

2. Asphalt Primer: ASTM D41.

3. Plastic Cement: ASTM D4586 Type II, cutback asphalt type.

D. Cover Board: ASTM C208 Type II cellulose fiber board, Grade 2, with the following characteristics:

1. Board Size: 48 x 96 inch

2. Board Thickness: ½ inch.

3. Thermal Conductivity: R=1.32 min. as determined by ASTM C177.

4. Board Edges: square

E. Flexible Flashings: Same material as membrane

F. Counterflashings: Sheet metal, as specified in Section 07 62 00.

2.2 ACCESSORIES

A. Wood Cant Strip: Specified in Section 06 10 53.

B. Sheathing Fasteners: ASTM C1002, steel drill type, for mechanical attachment of gypsum sheathing to metal deck.

C. Sheathing Joint Tape: Heat resistant type.

- D. Roofing Nails: Galvanized, hot dipped or non-ferrous type, size as required to suit application.
- E. Insulation Fasteners: Appropriate for purpose intended and approved by Factory Mutual and system manufacturer; length required for thickness of material with metal washers.
- F. Expansion Joint Assemblies: Prefabricated type as required by roofing membrane manufacturer to suit roofing system waterproof function and warranty.
- G. Roof Drains: per plumbing drawings and specifications.
- H. Sealants: As recommended by membrane manufacturer.
- I. Traffic Pads: Bituminous composition.
- J. Protective Cover Coating: Acrylic type, white color.
- 1. Roof Surface: Minimum solar reflectance index (SRI) of 78 for 75 percent of roof area, calculated in accordance with ASTM E1980.
 - a. Reflectance: Measured in accordance with ASTM E903, ASTM E1918, or ASTM C1549.
 - b. Emittance: Measured in accordance with ASTM E408 or ASTM C1371.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify surfaces and site conditions are ready to receive work.
- C. Verify deck is supported and secured.
- D. Verify deck is clean and smooth, free of depressions, waves, or projections, properly sloped to drains or eaves.
- E. Verify deck surfaces are dry and free of snow or ice. Verify flutes of metal deck are clean and dry.
- F. Verify roof openings, curbs, pipes, conduit, sleeves, ducts, and vents through roof are solidly set, band wood cant strips, wood nailing strips and reglets are in place.

3.2 APPLICATION

- A. Insulation Application:
 - 1. Ensure vapor retarder is clean and dry.
 - 2. Install insulation and cover board as recommended by NRCA to meet requirements of specified FM Standards.

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- 1 3. Mechanically fasten insulation to deck at full roof area.
- 2 4. Minimum Total Insulation Thickness: 1 1/2 inches on Transfer Station (match
- 3 existing).
- 4 5. Place boards at right angles to deck flutes with edges over flute surface for bearing
- 5 support.
- 6 6. Lay boards with edges in moderate contact without forcing. Cut insulation to fit
- 7 neatly to perimeter blocking and around penetrations through roof.
- 8 7. Lay tapered insulation at 1/4" per foot slope to create crickets between drains for
- 9 positive drainage.
- 10 8. Apply no more insulation than can be covered with membrane in same day.
- 11 9. Tape joints of insulation.
- 12 10. Mop apply cover board.
- 13 B. Membrane Application:
- 14 1. Apply membrane and primer.
- 15 2. Apply membrane; lap and seal edges and ends permanently waterproof.
- 16 3. Apply membrane smooth, free from air pockets, wrinkles, or tears. Ensure full
- 17 bond of membrane to substrate.
- 18 4. Extend membrane up cant strips and minimum of 8 inches onto vertical surfaces.
- 19 5. Extend membrane over vapor and air barrier of wall construction and seal.
- 20 6. Mop and seal membrane around roof protrusions and penetrations.
- 21 7. Provide waterproof cut-off to membrane at end of day's operation. Remove cut-off
- 22 before resuming roofing.
- 23 C. Flashings And Accessories:
- 24 1. Apply 2 layers flashings, first layer 90 mils and second 160 mils to seal to vertical
- 25 elements.
- 26 2. Secure to nailing strips at 4 inches oc.
- 27 3. Install prefabricated roofing expansion joints to isolate roof into areas as required
- 28 per manufacturer.
- 29 4. Coordinate installation of roof drains, curbs, and related flashings.
- 30 5. Seal flashings and flanges of items penetrating or protruding through membrane.

D. Surfacing:

1. Apply bitumen coating to top surface at rate recommended by membrane manufacturer. Embed cap sheet.
2. Apply reflective coating to surface at rate recommended by manufacturer.
3. Install traffic pads by setting in hot bitumen.

3.3 FIELD QUALITY CONTROL

- A. Section 01 70 00 - Execution and Closeout Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Correct identified defects or irregularities.
- C. Require site attendance of roofing and insulation materials manufacturers during installation of the Work.

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.
- C. Repair or replace defaced or disfigured finishes caused by work of this section.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect building surfaces against damage from roofing work.
- C. Where traffic must continue over finished roof membrane, protect surfaces.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes flashings and counter flashing, gutters and downspouts, and fabricated sheet metal items.

1. Provide reglets and accessories.

B. Related Sections:

1. Section 04 20 00 - Unit Masonry: Through-wall flashings in masonry.
2. Section 06 10 53 - Miscellaneous Rough Carpentry: Wood blocking for metal roofing substrate profiles.
3. Section 07 55 00 - Modified Bituminous Membrane Roofing.
4. Section 07 90 00 - Joint Protection.
5. Section 09 90 0 - Painting and Coating: Field painting.

1.2 REFERENCES

A. American Architectural Manufacturers Association:

1. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
2. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
3. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.
4. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. ASTM International:

1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
2. ASTM B32 - Standard Specification for Solder Metal.
3. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

4. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

5. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction,

Industrial, and Agricultural Applications.

6. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

C. Sheet Metal and Air Conditioning Contractors:

1. SMACNA - Architectural Sheet Metal Manual.

1.3 DESIGN REQUIREMENTS

A. Sheet Metal Flashings: Conform to criteria of SMACNA "Architectural Sheet Metal Manual."

B. Gutter and Downspout Components: Conform to applicable code for size and method of rain water discharge.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

C. Product Data: Submit data on manufactured components metal types, finishes, and characteristics.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with State of Ohio standard.

B. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Fabricator and Installer: Company specializing in sheet metal work with minimum three years documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.

B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials causing discoloration or staining.

1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate with Work of Section 03 10 00 and Section 04 20 00 for installing recessed flashing reglets.

PART 2 PRODUCTS

- A. Pre-Finished Galvanized Steel Sheet (Exposed Surfaces): ASTM A924, Grade A, or ASTM A653, G90 (Z275) zinc coating; 0.02-inch 24 gage core steel, shop pre-coated with PVDF (polyvinylidene fluoride) coating; color as selected from manufacturer's standard color selections.
- B. Gutters and downspouts shall be prefinished metal to match wall panels, 22 gauge.

2.1 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal with soft neoprene washers.
- B. Underlayment: ASTM D226; Type I, No. 15 unperforated asphalt felt.
- C. Slip Sheet: Rosin sized building paper.
- D. Primer: Zinc molybdate type.
- E. Protective Backing Paint: Zinc molybdate alkyd.
- F. Sealant: Type E butyl.
- G. Plastic Cement: ASTM D4586, Type I.

2.2 FABRICATION

- A. Form sections shape indicated on Drawings, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats of same material as sheet metal, interlocking with sheet.
- C. Form pieces in longest possible lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- F. Fabricate corners from one piece with minimum 18-inch-long legs; seam for rigidity, seal with sealant.
- G. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

- H. Fabricate snow guards in accordance with SMACNA Plate.
- I. Fabricate gutters to rectangular profile. Profile and size indicated.
- J. Fabricate accessories in profile and size to suit gutters and downspouts.
 - 1. Anchorage Devices: In accordance with SMACNA requirements and type recommended by fabricator.
 - 2. Gutter Supports: Brackets.
 - 3. Downspout Supports: Brackets.
 - 4. Gutter and Downspouts to match metal wall panels.
- K. Seal metal joints.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- C. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

- A. Install starter and edge strips, and cleats before starting installation.
- B. Install surface mounted reglets to lines and levels indicated on Drawings. Seal top of reglets with sealant.
- C. Paint concealed metal surfaces with protective backing paint to minimum dry film thickness of 15 mil.

3.3 INSTALLATION

- A. Insert flashings into reglets to form tight fit. Secure in place with lead wedges. Seal flashings into reglets with sealant.
- B. Apply plastic cement compound between metal flashings and felt flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.
- E. Install snow guards up slope from eaves and valleys.

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- 1 F. Secure gutters and downspouts in place using concealed fasteners.
- 2 G. Slope gutters minimum 1/8 inch per foot.
- 3 H. Connect downspouts to storm sewer system. Seal connection watertight.
- 4 I. Set splash pads on roof under downspouts.
- 5 J. Seal metal joints watertight.
- 6 K. End-dams at lintels in masonry walls

7 3.4 FIELD QUALITY CONTROL

- 8 A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and
- 9 balancing.
- 10 B. Inspection will involve surveillance of Work during installation to ascertain compliance
- 11 with specified requirements.

12 END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes sealants and joint backing, precompressed foam sealers and accessories.

- B. Related Sections:

- 1. Division 4 Section "Unit Masonry Assemblies" for masonry control and expansion joint fillers and gaskets.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

- 1. Use manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.

- B. 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 application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
 - 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 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.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- 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.
- E. Qualification Data: For qualified Installer and testing agency.
- F. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- G. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- I. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- J. 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.

K. Field-Adhesion Test Reports: For each sealant application tested.

L. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.6 PROJECT 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.

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.

1.7 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 Substantial Completion.

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: 10 years from date of Substantial Completion for silicone sealant.

2. Warranty Period: 5 years from date of Substantial Completion for urethane sealant.

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 MATERIALS, 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: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.
4. Other: 750 g/l

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Pecora 311 NS Silicone Sealant.
- b. VOC < 40 g/L

c. JS #1

B. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Pecora Corporation; 890 NST.
- b. VOC 98 g/L
- c. JS #2

C. Mildew-Resistant, 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, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Pecora Corporation; 898NST.
- b. VOC 50 g/L
- c. JS #5

2.3 URETHANE JOINT SEALANTS

A. Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Pecora Corporation; Urexpand NR-201.
- b. VOC 50 g/L
- c. JS #3

B. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Pecora Dynatrol I-XL
- b. VOC <100 g/L.
- c. JS #7

2.4 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Pecora Corporation; AC-20+.
- b. VOC 31 g/L

c. JS #4

2.5 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.6 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 joint-sealant performance.
- 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.

- 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.

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 in joints too shallow for backer rod.

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.
4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

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 and with manufacturer's written recommendations.

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 1 test for each 1000 feet of joint length thereafter or 1 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 passes 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 fill, 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 and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces **JS-#1**.

1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints between different materials listed above.
 - c. Other joints as indicated.
2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- B. Joint-Sealant Application: Exterior joints in vert. surfaces/horizontal nontraffic surfaces **JS-#2**.

1. Joint Locations:
 - a. Control and expansion joints in unit masonry.
 - b. Joints between metal panels.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors windows and louvers.
 - e. Control and expansion joints in ceilings and other overhead surfaces.
 - f. Other joints as indicated.
2. Silicone Joint Sealant: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- C. Joint-Sealant Application: Interior joints in horizontal surfaces **JS-#3**.

1. Joint Locations:

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- 1 a. Isolation joints in cast-in-place concrete slabs.
- 2 b. Control and expansion joints in tile flooring.
- 3 c. Other joints as indicated.
- 4 2. Urethane Joint Sealant: Single component, s/l, traffic grade.
- 5 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- 6 D. Joint-Sealant Application: Interior joints in vert. surfaces/horizontal nontraffic surfaces **JS-#4**.
- 7 1. Joint Locations:
- 8 a. Control and expansion joints on exposed interior surfaces of exterior walls.
- 9 b. Perimeter joints of exterior openings where indicated.
- 10 c. Tile control and expansion joints.
- 11 d. Vertical joints on exposed surfaces of interior unit masonry walls and partitions.
- 12 e. Perimeter joints between interior wall surfaces and frames of interior doors and
- 13 windows.
- 14 f. Other joints as indicated.
- 15 2. Joint Sealant: Latex.
- 16 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- 17 E. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal
- 18 nontraffic surfaces **JS-#5**.
- 19 1. Joint Sealant Location:
- 20 a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
- 21 b. Tile control and expansion joints where indicated.
- 22 c. Other joints as indicated.
- 23 2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone.
- 24 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 07 95 00

ROOF /WALL EXPANSION CONTROL

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes expansion joint assemblies for roof/ wall surfaces.

1.2 REFERENCES

- A. ASTM International:

1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
2. ASTM B455 - Standard Specification for Copper-Zinc-Lead Alloy (Leaded-Brass) Extruded Shapes.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Shop Drawings: Indicate joint and splice locations, miters, layout of work, affected adjacent construction and anchorage locations.
- C. Product Data: Submit joint assembly profiles, profile dimensions, anchorage devices, and available colors and finish.

1.4 FIELD MEASUREMENTS

- A. Verify field measurements are as instructed by manufacturer.

PART 2 PRODUCTS

2.1 COMPONENTS

- A. Nonreinforced flexible white EPDM conforming to ASTM D 4637, 60 mil thick.
- B. Closed cell foam, minimum thickness of 3/8" for 4 inches below widths, 1/2 in for 6 inches and 8 inches below widths, 5/8" for 10 inches below widths and 3/4" inches for 12 inches below widths.
- C. Fiber glass insulation wrapped in 4 mil minimum thickness polyethylene sleeve and supported by continuous neoprene-coated nylon fabric vapor retarder.
- D. Backing Paint: Asphaltic type.

2.2 FABRICATION

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- A. Joint Covers: Aluminum cover plate, aluminum frame construction, retainers with resilient elastomeric filler strip, designed to permit plus or minus 50 percent joint movement with full recovery, flush and recess mounted.
- B. Back paint components in contact with cementitious materials.
- C. Galvanize embedded ferrous metal anchors and fastening devices.
- D. Shop assemble components and package with anchors and fittings.
- E. Furnish joint components in single length wherever practical. Minimize site splicing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify joint preparation and affected dimensions are acceptable.

3.2 PREPARATION

- A. Provide anchoring devices for installation and embedding.
- B. Provide templates and rough-in measurements.

3.3 INSTALLATION

- A. Align work plumb and level, flush with adjacent surfaces.
- B. Rigidly anchor to substrate to prevent misalignment.
- C. Extend roof joint covers over curbs, parapets, fascia and other elements in the construction profile, with factory-fabricated corners, transitions, intersections and terminations to provide continuous, uninterrupted, waterproof assemblies.
- D. Nail anchorage flanges securely to curbs, cant strips and other substrates as recommended by manufacturer. Coordinate installation of joint covers with adjacent construction for weathertight assembly.

3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Do not permit traffic over unprotected floor joint surfaces.
- C. Install removable strippable coating to protect finish surface.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

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. Standard and custom hollow metal doors and frames.
2. Steel sidelight, borrowed lite and transom frames.

B. Related Sections:

1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
2. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
3. Division 08 Section "Door Hardware".
4. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI/SDI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
7. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
9. ASTM C 1363 - Standard Test Method for Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
10. ANSI/BHMA A156.115 - Hardware Preparation in Steel Doors and Frames.
11. ANSI/SDI 122 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.

12. ANSI/NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
13. ANSI/NFPA 105: Standard for the Installation of Smoke Door Assemblies.
14. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association.
15. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
16. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.
- B. Door hardware supplier is to furnish templates, template reference number and/or physical hardware to the steel door and frame supplier in order to prepare the doors and frames to receive the finish hardware items.
- C. Shop Drawings: Include the following:
 1. Elevations of each door design.
 2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 4. Locations of reinforcement and preparations for hardware.
 5. Details of anchorages, joints, field splices, and connections.
 6. Details of accessories.
 7. Details of moldings, removable stops, and glazing.
 8. Details of conduit and preparations for power, signal, and control systems.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal doors and frames through one source from a single manufacturer wherever possible.
- B. Quality Standard: In addition to requirements specified, comply with ANSI/SDI A250.8, latest edition, "Recommended Specifications for Standard Steel Doors and Frames".
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL 10C.
 1. Oversize Fire-Rated Door Assemblies Construction: For units exceeding sizes of tested assemblies, attach construction label certifying doors are built to standard construction requirements for tested and labeled fire rated door assemblies except for size.
 2. Temperature-Rise Limit: Where indicated and at vertical exit enclosures (stairwell openings) and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.
 3. Smoke Control Door Assemblies: Comply with NFPA 105.

- a. Smoke "S" Label: Doors to bear "S" label, and include smoke and draft control gasketing applied to frame and on meeting stiles of pair doors.

- D. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257. Provide labeled glazing material.

- E. Pre-Submittal Conference: Conduct conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier, Installer, and Contractor to review proper methods and procedures for installing hollow metal doors and frames and to verify installation of electrical knockout boxes and conduit at frames with electrified or access control hardware.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project site storage. Do not use non-vented plastic.

- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

- B. Warranty includes installation and finishing that may be required due to repair or replacement of defective doors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 1 A. Manufacturers: Subject to compliance with requirements, provide products by one of the
2 following or approved equal:

- 3 1. CECO Door Products.
4 2. Curries Company.
5 3. Republic Doors.

6 2.2 MATERIALS

- 7 A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for
8 exposed applications.

- 9 B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with
10 minimum G60 metallic coating.

- 11 C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B;
12 with minimum G60 metallic coating.

13 2.3 STANDARD HOLLOW METAL DOORS

- 14 A. General: Provide 1-3/4-inch doors of design indicated, not less than thickness indicated;
15 fabricated with smooth surfaces, without visible joints or seams on exposed faces unless
16 otherwise indicated. Comply with ANSI/SDI A250.8.

- 17 B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that
18 complies with ASTM A 653/A 653M, Coating Designation A60. Provide doors complying with
19 requirements indicated below by referencing ANSI/SDI A250.8 for level and model and
20 ANSI/SDI A250.4 for physical performance level:

- 21 1. Design: Flush panel.
22 2. Core Construction: Manufacturer's standard polystyrene.
23 3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum
24 16 gauge (0.053-inch - 1.3-mm) thick steel, Model 2.
25 4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel
26 channel not less than 16 gauge, extending the full width of the door and welded to the face
27 sheet. Doors with an inverted top channel to include a steel closure channel, screw attached,
28 with the web of the channel flush with the face sheets of the door. Plastic or composite
29 channel fillers are not acceptable.
30 5. Hinge Reinforcement: Minimum 7-gauge (3/16") plate 1-1/4" x 9" or minimum 14-gauge
31 continuous channel with pierced holes, drilled and tapped.
32 6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing
33 plates from same material as door face sheets.

- 34 C. Manufacturers Basis of Design:

- 35 1. CECO Door Products Regent Series .

- 36 D. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with
37 ASTM A 1008/A 1008M. Provide doors complying with requirements indicated below by
38 referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical
39 performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard kraft-paper honeycomb, or one-piece polystyrene core, securely bonded to both faces.
 - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gauge (0.042-inch - 1.0-mm) thick steel, Model 2.
4. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gauge, extending the full width of the door and welded to the face sheet.
5. Hinge Reinforcement: Minimum 7 gauge (3/16") plate 1-1/4" x 9" or minimum 14 gauge continuous channel with pierced holes, drilled and tapped.
6. Hardware Reinforcements: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

E. Manufacturers Basis of Design:

1. CECO Door Products Regent Series.

2.4 STANDARD HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM A 653/A 653M, Coating Designation A60.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames with "closed and tight" miter seams continuously welded on face, finished smooth with no visible seam unless otherwise indicated.
3. Frames: Minimum 14 gauge (0.067-inch - thick steel sheet.
4. Manufacturers Basis of Design:

a. CECO Door Products SU Series.

C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A 1008/A 1008M.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as slip-on drywall types, with "closed and tight" miter seams.
3. Frames: Minimum 16 gauge (0.053-inch - thick steel sheet.
4. Manufacturers Basis of Design:

a. CECO Door Products DQ Series (Drywall Profile).

D. Fire rated frames: Fabricate frames in accordance with NFPA 80, listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

E. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, formed from metallic coated material, not less than 0.042 inchthick, with corrugated or perforated straps not less than 2 incheswide by 10 incheslong; or wire anchors not less than 0.177 inchthick.
2. Stud Wall Type: Designed to engage stud and not less than 0.042 inchthick.
3. Compression Type for Drywall Slip-on (Knock-Down) Frames: Adjustable compression anchors.

B. Floor Anchors: Floor anchors to be provided at each jamb, formed from metallic coated material, not less than 0.042 inchesthick.

C. Mortar Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.6 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches thick.

2.7 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. When shipping limitations so dictate, frames for large openings are to be fabricated in sections for splicing or splining in the field by others.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide optional weep-hole openings in bottom of exterior doors to permit moisture to escape where specified.
2. Glazed Lites: Factory cut openings in doors with applied trim or kits to fit. Factory install glazing where indicated.
3. Astragals: Provide overlapping astragals as noted in door hardware sets in Division 08 Section "Door Hardware" on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted.
4. Electrical Raceways: Provide hollow metal doors to receive electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware". Wire nut connections are not acceptable.

D. Hollow Metal Frames:

1. Shipping Limitations: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
2. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - a. Welded frames are to be provided with two steel spreaders temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.
3. Knocked Down Frames: Provide frames with locking corner tabs which permit field assembly. Factory install compression type anchors and countersunk screw holes to secure the bottom of the jambs.
4. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
5. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
6. Mortar Guards: Provide guard boxes at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
7. Electrical Thru-Wiring: Provide hollow metal frames receiving electrified hardware with loose wiring harness (not attached to open throat components or installed in closed mullion tubes) and standardized Molex™ plug connectors on one end to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electric through-wire transfer hardware or wiring harness specified in hardware sets in Division 08 Sections "Door Hardware" and "Access Control Hardware".
8. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
9. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches high.
 - 2) Three anchors per jamb from 60 to 90 inches high.
 - 3) Four anchors per jamb from 90 to 120 inches high.
 - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
 - b. Stud Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches high.
 - 2) Four anchors per jamb from 60 to 90 inches high.
 - 3) Five anchors per jamb from 90 to 96 inches high.
 - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
 - 5) Two anchors per head for frames above 42 inches wide and mounted in metal stud partitions.

10. Door Silencers: Except on weatherstripped or gasketed doors, drill stops to receive door silencers. Silencers to be supplied by frame manufacturer regardless if specified in Division 08 Section "Door Hardware".

11. Bituminous Coating: Where frames are fully grouted with an approved Portland Cement based grout or mortar, coat inside of frame throat with a water based bituminous or asphaltic emulsion coating to a minimum thickness of 3 mils DFT, tested in accordance with UL 10C and applied to the frame under a 3rd party independent follow-up service procedure.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-template, mortised and surface mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.8 STEEL FINISHES

A. Prime Finishes: Doors and frames to be cleaned, and chemically treated to insure maximum finish paint adhesion. Surfaces of the door and frame exposed to view to receive a factory applied coat of rust inhibiting shop primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead and chromate free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; and compatible with substrate and field-applied coatings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. General Contractor to verify the accuracy of dimensions given to the steel door and frame manufacturer for existing openings or existing frames (strike height, hinge spacing, hinge back set, etc.).

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 and NFPA 80 at fire rated openings.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete and frames properly set and secured, remove temporary braces, leaving surfaces smooth and undamaged. Shim as necessary to comply with installation tolerances.
 - 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post-installed expansion anchors.
 - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with mortar.
 - 4. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch plus or minus 1/16 inch.
 - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.
 - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
- D. Field Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

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- 1 B. Remove grout and other bonding material from hollow metal work immediately after installation.
- 2 C. Prime-Coat and Painted Finish Touchup: Immediately after erection, sand smooth rusted or
- 3 damaged areas of prime coat, or painted finishes, and apply touchup of compatible air drying,
- 4 rust-inhibitive primer, zinc rich primer (exterior and galvanized openings) or finish paint.

5 END OF SECTION

SECTION 08 36 13

SECTIONAL AND HIGH-SPEED RUBBER DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes electric overhead sectional door, high speed rolling rubber doors and operating hardware, supports and controls.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.

2. Section 04 20 00 - Unit Masonry: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.

3. Section 05 50 00 - Metal Fabrications: Steel channel opening frame.

4. Section 06 10 53 - Miscellaneous Rough Carpentry: Rough wood blocking for door opening.

5. Section 07 90 00 - Joint Protection: Perimeter sealant and backup materials.

6. Section 08 71 00 - Door Hardware: Cylinder locks.

7. Section 08 80 00 - Glazing: Glass for door lights.

8. Section 09 90 00 - Painting and Coating: Field paint finish.

1.2 REFERENCES

A. ASTM International:

1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

2. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.

3. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

B. Door and Access Systems Manufacturers Association International:

1. DASMA 102 - Specifications for Sectional Overhead Type Doors.

C. National Electrical Manufacturers Association:

1. NEMA MG 1 - Motors and Generators.

1.3 SYSTEM DESCRIPTION

A. Panels: Flush steel, insulated.

B. Lift Type: High lift operating style with track and hardware.

C. Operation: Electric.

D. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures.

B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

C. Product Data: Submit component construction, anchorage method, and hardware.

D. Samples: Submit two exterior and interior panel finish samples, 18 x 18 inch in size, illustrating color and finish.

E. Manufacturer's Installation Instructions: Submit special procedures, and perimeter conditions requiring special attention.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with DASMA 102, Application Type Commercial.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc., as suitable for purpose specified.

C. Surface Burning Characteristics:

1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

D. Perform Work in accordance with State of Ohio standard.

1.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

B. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

1.9 WARRANTY

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- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five-year manufacturer warranty for electric operating equipment.
- C. Furnish ten-year manufacturer warranty for any delaminations.
- D. Furnish life of door warranty for fabrication.
- E. Furnish one year labor warranty.

PART 2 PRODUCTS

2.1 SECTIONAL OVERHEAD DOORS

- A. Product Description: Steel overhead sectional doors, electric operation, stock configuration and hardware.
 - 1. Door Nominal Thickness: 2" inches thick.
 - 2. Flush Steel Panel Construction: Outer steel sheet of minimum 0.022-inch thick, flat profile; End caps shall be sealed with 16 gage hot dipped galvanized steel full height; core reinforcement of sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; insulated.

2.2 HIGH SPEED ROLLING RUBBER DOORS

A. MATERIALS

- 1. Door Panel:
 - a. Fabric:
 - 1) 2 layers of Styrene Butadiene Rubber (SBR) each 1/8" (0.8mm) thick, 70 durometer; sandwiched with 1-ply, 110lbs (50kg) polyester cord center.
 - 2) Complete with bonded fabric beveled continuous windlocks, providing normal resiliency and flexibility at temperatures ranging from -40 degrees F to +180 degrees F.
 - b. Characteristics:
 - 1) Breaking strength 1100 lbs./in/ply
 - c. Standard Color

2.3 COMPONENTS

A. SECTIONAL OVERHEAD DOORS

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1. Sheet Steel: ASTM A653/A653M galvanized to G60, pre-coated with silicone polyester, plain surface.
2. Insulation: Rigid nominal R-Value of 5.
3. Metal Primer Paint: Zinc chromate type.
4. Glazing: Fully tempered clear float glass specified in Section 08 80 00.
5. Glazed Lights: Three glazed lights for each panel; set in place with resilient glazing channel.

2.4 ACCESSORIES

B. HIGH SPEED ROLLING RUBBER DOORS

1. Door Header:
 - a. Door roll
 - 1) Fabricate minimum 8 5/8" diameter, steel tube from 0.188" steel complying with ASTM A513.
 - 2) Drum tube deflection shall not exceed 0.03" per foot of opening width.
 - 3) Drive barrel shafts are constructed of 2" diameter 1045 bolt-on steel shafts.
 - b. Idler
 - 1) Fabric guiding barrel shall be constructed of minimum 4" O.D. round tubing with a minimum wall thickness of 0.134" and supported by 1 1/2" diameter 1018 steel shafts.
 - c. Top plates
 - 1) Constructed of minimum 1/4" hot-rolled steel laser-cut plates with heavy-duty, self-aligning bearings with cast iron housings to support both the spring and idler barrels. 2" diameter shaft bearing shall be load-rated at 10800 lbs. dynamic and 6400 lbs. static. 1 1/2" diameter idler shaft bearing shall be load-rated at 8150 lbs dynamic and 4400 lbs. static.
 - 2) To include top roll alignment plates for installation.
 - d. Counterbalance System
 - 1) Doors up to 16ft x 16ft are to be springless direct drive.
2. Side Frames:
 - a. Frames
 - 1) Frame assemblies shall be constructed of steel members to form a slot of sufficient depth to allow the thicker edges of the rubber curtain

windlocks to move freely in the guides at all times. Steel members are to be of sufficient thickness and rigidity to maintain the windlocks within the guides while enabling the windlocks to break away during impact.

b. Wind Resistance

1) Wind resistant capabilities shall include a windlok rubber component on each side of the curtain fabric. The windlok feature runs the full height of the door curtain and is contained in the side frames to secure the door under wind pressure and to decrease air infiltration.

c. Paint

1) Painted with durable, chemical and corrosion resistant coating

2) Color: orange

d. Side frames covers shall be hinged to allow easy curtain access.

3. Bottom Bar:

a. Bottom bar shall extend the full width of the curtain, sufficient to maintain the bottom edge of the curtain parallel to the door threshold at all times. The bottom bar shall be constructed of a steel angle and flat bar bolted together and shall have a breakaway center section to reduce risk of damage during accidental impacts and provide ease of straightening, allowing for simple re-assembly.

b. 6" tall weatherproof rubber loop made of EPDM able to seal uneven finished floors.

c. Door to be provided with failsafe electric safety edge. No pneumatic edges allowed.

d. Bottom bar and door operation must be totally wireless. No coil cords allowed. All faults registering from the wireless device must be displayed on the control panel.

e. Bottom bar wireless system battery life must be more than three years. Battery must be able to be replaced at ground level. Bottom bar controls must indicate in advance when battery must be replaced. 6

2.5 ELECTRICAL CHARACTERISTICS AND COMPONENTS

B. HIGH SPEED ROLLING DOORS

1. Control Panel:

a. UltraSmart controller housed in a NEMA 4/12 enclosure.

b. Control Panel must be provided with fusible rotary disconnect mounted on the control panel. No exceptions.

- c. Controls must include a variable frequency drive system capable of infinitely variable speed control in both the up and down directions. Fused 24V AC power for the door controller and optional activators.
- d. All interior control panel components must be touch-safe (protected from high voltage when control panel door is open). No exposed high voltage contacts.
- e. All door operational parameters must be set on the outside face of the control panel. No fixed or rotary limit switches.
- f. Controller should have factory set parameters; a two-line display that shows functional information during normal operation and will advise if maintenance is required for abnormal situations.
- g. Controller and panel must be fully modular. Separate modules for activation, safety, drive, controls, operation and all other options. Must be expandable to accommodate additional modules for desired inputs and outputs.
- h. Controls must be fully self-diagnostic.
- i. Door must be provided with an absolute encoder.

2. Safety Features:

- a. Door to be provided with Safety Light Curtain System.
- b. Light curtain must be attached to the side frame material and cover area up to a height of no less than six feet.
- c. Light curtain system must have a minimum of 96 infrared thru-beam optical sensors.
- d. Control panel must indicate in written visible English each time the light curtain is broken. Door to be provided with failsafe electric safety edge. Door controller must indicate if the safety edge is not operable.

3. Speed:

- a. Door to operate at a variable speed up to 48" per second in the up direction depending on door size. Door must operate at a variable speed in the down direction.

- 4. All components furnished by factory.

2.6 FACTORY FINISHING –SECTIONAL OVERHEAD DOORS

- A. Exterior Surfaces: Prime paint for finish specified in Section 09 90 00.
- B. Interior Surfaces: Prime paint for finish specified in Section 09 90 00.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

3.2 PREPARATION

A. Prepare opening to permit correct installation of door unit to perimeter air and vapor retarder seal.

3.3 INSTALLATION

A. SECTIONAL OVERHEAD DOOR

1. Anchor assembly to wall construction and building framing without distortion or stress.

2. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

3. Fit and align door assembly including hardware.

4. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

5. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.

6. Install perimeter weather stripping.

B. HIGH SPEED ROLLING DOORS

1. Install door assembly in accordance with manufacturer's instructions.

2. Use anchorage devices to securely fasten assembly to wall constructions and building framing without distortion or stress.

3. Fit and align assembly including hardware; level and plumb to provide smooth operation.

4. Coordinate installation of electrical service. Complete wiring from disconnects to unit components.

5. Touch-up paint on frame and other painted surfaces in accord with painting section.

a. Upon completion of installation, including work by other trades, lubricate, test and adjust doors to operate in accordance with manufacturer's product data. Final adjustments shall be made by manufacturer's authorized representative.

b. Protect finished installations until Date of Substantial Completion. Repair damage to door panel, hardware and operators.

3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Plumb: 1/16 inch.
- C. Maximum Variation from Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- E. Maintain dimensional tolerances and alignment with adjacent work.

3.5 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Manufacturers' field services.
- B. Ensure operation and adjustments to door assembly for specified operation.

3.6 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Adjust door assembly to smooth operation and in full contact with weatherstripping.

3.7 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean doors, frames and glass.
- C. Remove temporary labels and visible markings.

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

END OF SECTION

SECTION 08 45 00

TRANSLUCENT WALL AND ROOF ASSEMBLIES

PART 1 GENERAL

1.1 SUMMARY

- A. Section includes supported aluminum framed vertical and skylight sloped system with sandwich panels of translucent skins separated with an aluminum grid.

1. Provide integral beam covers.

2. Provide perimeter sealants.

3. Flashings.

- B. Related Sections:

1. Section 05 12 00 - Structural Steel Framing: Steel fabricated attachment members and framed openings.

1.2 REFERENCES

- A. Aluminum Association:

1. AA DAF-45 - Designation System for Aluminum Finishes.

- B. American Architectural Manufacturers Association:

1. AAMA 501 - Methods of Test for Exterior Walls.

2. AAMA 503 - Voluntary Specification for Field Testing of Metal Storefronts, Curtain Wall and Sloped Glazing Systems.

3. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.

4. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

5. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.

6. AAMA 2604 - Voluntary specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

7. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

8. AAMA CW-10 - Care and Handling of Architectural Aluminum from Shop to Site.

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- 1 9. AAMA CW-11 - Design Wind loads for Buildings and Boundary Layer Wind
2 Tunnel Testing.
- 3 10. AAMA CW-DG-1 - Aluminum Curtain Wall Design Guide Manual.
- 4 C. American Society of Civil Engineers:
- 5 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- 6 D. ASTM International:
- 7 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
- 8 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized)
9 Coatings on Iron and Steel Products.
- 10 3. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated
11 (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- 12 4. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet
13 and Plate.
- 14 5. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy
15 Extruded Bars, Rods, Wire, Profiles, and Tubes.
- 16 6. ASTM D635 - Standard Test Method for Rate of Burning and Extent and Time of
17 Burning of Plastics in a Horizontal Position.
- 18 7. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of
19 Plastics.
- 20 8. ASTM D2843 - Standard Test Method for Density of Smoke from the Burning or
21 Decomposition of Plastics.
- 22 9. ASTM E84 - Standard Test Method for Surface Burning Characteristics of
23 Building Materials.
- 24 10. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage
25 Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure
26 Differences Across the Specimen.
- 27 11. ASTM E330 - Standard Test Method for Structural Performance of Exterior
28 Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- 29 12. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows,
30 Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
- 31 13. ASTM E413 - Classification for Rating Sound Insulation.
- 32 14. ASTM E1105 - Standard Test Method for Field Determination of Water
33 Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform
34 or Cyclic Static Air Pressure Difference.

E. National Fenestration Rating Council Incorporated:

1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.

F. South Coast Air Quality Management District:

1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

G. SSPC: The Society for Protective Coatings:

1. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).

2. SSPC Paint 25 - Red Iron Oxide, Zinc Oxide, Raw Linseed Oil, and Alkyd Primer.

1.3 SYSTEM DESCRIPTION

A. Panel System: Translucent fiberglass sandwich panel system with supplementary support framing, shop fabricated, factory prefinished, with battens, cap strips, related flashings, anchorage and attachment devices.

1.4 PERFORMANCE REQUIREMENTS

A. Wall System Design: Design and size components to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall, including building corners.

1. As calculated in accordance with applicable code., as tested in accordance with ASTM E330.

G. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable code.

C. Deflection: L/60

D. System Assembly: Accommodate following without damage to system, components or deterioration of seals.

1. Movement within system.

2. Movement between system and perimeter framing components.

3. Dynamic loading and release of loads.

4. Deflection of structural support framing.

5. Tolerance of supporting components.

E. Light Transmission: 20 percent at Vehicle Maintenance, 35 Percent at Transfer Station

F. Thermal Resistance of Panel: At Transfer Station:0.53 for walls.

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- 1 G. Air Infiltration: Limit air infiltration through assembly to 0.06 cfm/sq ft. of wall area, as
2 determined by manufacturer when measured in accordance with AAMA 501.
- 3 H. Condensation Resistance Factor: CRF of 80 when measured in accordance with AAMA
4 1503 as measured on the bond line. Thermally broken .23U panels to have minimum 1”
5 thermal break. Urethane & debridged breaks are not acceptable.
- 6 I. Expansion / Contraction: System to provide for expansion and contraction within system
7 components caused by cycling temperature range of 170 degrees F over 12-hour period
8 without causing detrimental effect to system components.
- 9 J. System Internal Drainage: Drain water entering joints, condensation occurring in framing
10 system, or migrating moisture occurring within system, to exterior by weep drainage
11 network.
- 12 K. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout
13 assembly, primarily in line with inside face of glazing panel and heel bead of glazing
14 compound.
- 15 L. Not Permitted: Vibration harmonics, wind whistles, noises caused by thermal movement,
16 thermal movement transmitted to other building elements, loosening, weakening, or
17 fracturing of attachments or components of system.
- 18 M. Color Stability: Full thickness of exterior face sheet shall not change color more than 3.0
19 CIE Units Delta E by ASTM D2244 after 5 years outdoor South Florida weathering at 5
20 degrees facing south, determined by an average of at least 3 white samples with and without
21 a protective film or coating to ensure long term color stability. Color stability shall be
22 unaffected by abrasion or scratching.
- 23 N. Daylighting: Provide a computer simulation (RADIANCE) that demonstrates that 75% of
24 more of all occupied spaces achieve daylight illuminance levels of a minimum 25 fc and a
25 maximum of 500 fc in a clear sky condition on September 21st at 9 AM & 3 PM FOR
26 LEED CREDIT 8.1

27 1.5 SUBMITTALS

- 28 A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- 29 B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances,
30 anticipated deflection under load, affected related Work, weep drainage network,
31 expansion and contraction joint location and details, and field welding required.
- 32 C. Product Data: Submit component dimensions; describe components within assembly,
33 anchorage and fasteners, panel configuration, and internal drainage details.
- 34 D. Design Data: Provide framing member structural and physical characteristics,
35 [calculations,] dimensional limitations.
- 36 E. Submit two samples 12 x 24 inches in size illustrating prefinished aluminum surface,
37 specified panel with skins, glazing materials illustrating edge and corner.

1 F. Test Reports: Submit product test reports from a qualified testing agency indicating
2 compliance with the performance requirements listed in part 1.4 and quality assurance
3 requirements listed in part 1.7. Test reports must be based on manufacturer's current
4 production

5 G. Manufacturer's Installation Instructions: Submit special installation requirements.

6 1.7 QUALITY ASSURANCE

7 A. Perform Work in accordance with AAMA CW-DG-1 - Aluminum Curtain Wall Design
8 Guide Manual.

9 B. Light Transmitting Plastics: Class CC1 or Class CC2 as defined by the applicable code
10 when tested in accordance with ASTM D635 in thickness for intended use.

11 1. Self-Ignition Temperature: Minimum 650 degrees F (343 degrees C) when tested
12 in accordance with ASTM D1929.

13 2. Smoke Developed Index: Maximum 250 (improved performance standard) when
14 tested in accordance with ASTM E84 or maximum 75 when tested in accordance
15 with ASTM D2843 in thickness for intended use.

16 C. Surface Burning Characteristics:

17 1. Maximum 50/250 flame spread/smoke index when tested in accordance with
18 UL723. Face sheets to be UL listed.

19 D. Apply label from agency approved by authority having jurisdiction to identify each foam
20 plastic insulation board.

21 E. Perform Work in accordance with State of Ohio standard.

22 1.8 QUALIFICATIONS

23 A. Manufacturer: Company specializing in manufacturing products specified in this section
24 with minimum three years [documented] experience.

25 B. Installer: Company specializing in performing Work of this section with minimum three
26 years' experience approved by manufacturer.

27 C. Design structural support framing components under direct supervision of Professional
28 Engineer experienced in design of this Work and licensed at Project location. in State of
29 Ohio.

30 1.9 DELIVERY, STORAGE, AND HANDLING

31 A. Section 01 60 00 - Product Requirements

32 B. Handle Products in accordance with AAMA MCWM-1 - Curtain Wall Manual.

- 1 C. Protect prefinished aluminum surfaces with wrapping. Do not use adhesive papers or
2 sprayed coatings which bond when exposed to sunlight or weather. Puncture wrappings at
3 ends for ventilation.

4 1.10 ENVIRONMENTAL REQUIREMENTS

- 5 A. Section 01 60 00 - Product Requirements

- 6 B. Do not install sealants when ambient temperature is less than 40 degrees F during and 48
7 hours after installation.

- 8 C. Maintain this minimum temperature during and after installation of sealants.

9 1.11 COORDINATION

- 10 A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

- 11 B. Coordinate Work with installation of air barrier placement, vapor retarder placement, and
12 related components and materials.

13 1.12 WARRANTY

- 14 A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product
15 bonds.

- 16 B. Furnish five-year warranty to include coverage for complete system for failure to meet
17 specified requirements

18 PART 2 PRODUCTS

19 2.1 TRANSLUCENT WALL AND SKYLIGHT ROOF ASSEMBLIES

- 20 A. Manufacturers (IF EXISTING PANELS CAN NOT BE REUSED):

21 1. Kalwall Corp.

22 2. Structures Unlimited

23 3. Major Industries

24 4. Substitutions: Not Permitted

- 25 B. Listing of manufacturers names in this specification does not constitute approval of their
26 products. Products from the listed manufacturers will only be approved subject to
27 compliance with the quality assurance and performance requirements of this specification.

- 28 C. Product Description: Factory assembled panels of translucent skins permanently bonded to
29 aluminum or thermally broken composite grid core for vertical and sloped applications.
30 Factory prefinished, including perimeter flashings. Framing grid is self-supporting.

31 2.2 COMPONENTS

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- 1 A. Translucent Sandwich Panels: Bonded to both sides of structural extruded aluminum or
2 thermally broken composite grid.
- 3 1. Exposed surfaces of exterior sheet chemically and permanently treated to protect
4 against surface erosion and extreme weather conditions.
- 5 2. Exposed surface of interior sheets fire retardant to ASTM E108 CLASS A.
- 6 3. Panel Thickness: 2-3/4 inches
- 7 4. Exterior Facing Sheets: Translucent White or Crystal, as selected by Architect.
- 8 5. Interior Facing Sheets: Translucent White or Crystal, as selected by Architect.
- 9 B. Glazing Accessories: Manufacturer recommended type to suit application to achieve
10 weather, moisture, and air infiltration requirements.
- 11 C. Extruded Aluminum: ASTM B221 (ASTM B221M); 6063 alloy, T5 temper typical, 6061
12 alloy, T6 temper for extruded structural members.
- 13 D. Sheet Aluminum: ASTM B209 (ASTM B209M), 3003 or 5005 alloy, H15, H16, or H34
14 temper.
- 15 E. Mullions: Aluminum thermally broken, with interior section insulated from exterior
16 attachments; permanent glazing stops of sufficient size and strength to provide bite on
17 panels prior to and during glazing; drainage holes, deflector plates and internal flashings
18 to accommodate internal weep drainage system; internal mullion baffles to eliminate "stack
19 effect" air movement within internal spaces.
- 20 F. Reinforced Mullion: Extruded aluminum cladding with internal reinforcement of shaped
21 steel structural section.
- 22 G. Battens, Cover Strips, Cover Plates, and Integral Flashings: Extruded aluminum, to suit
23 location and application; sized to rigidly retain panels in place.
- 24 H. Beam Covers: Sheet aluminum, full contact pressure bonded to rigid core ensuring flat
25 surface, finish to match translucent panel system mullion sections.
- 26 I. Sealant and Backing Materials: As specified in Section 07 90 00 of Types described below.
- 27 1. Perimeter Sealant: High performance general purpose exterior nontraffic silicone.
- 28 2. Sealant Used Within System (Not Used for Glazing): Exterior metal lap joint
29 sealant at metal-to-metal joints, manufacturer recommended sealants at
30 other locations.
- 31 3. Interior Sealants and Sealant Primers: Maximum volatile organic compound
32 content in accordance with SCAQMD Rule 1168.
- 33 J. Flashings: Secure with concealed fastening method.
- 34 1. Aluminum: Minimum 0.032 inch thick, finish to match adjacent aluminum.

K. Weather Seals: To suit application; non-bleeding; non-staining.

2.3 FABRICATION

A. Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments concealed from view.

E. Reinforce framing members for external imposed loads.

2.4 FACTORY FINISHING

A. Painted Aluminum Surfaces: AA-M12C12R1x non-specular as fabricated mechanical finish, chemically cleaned, and prepared for applied coating; with organic coating.

1. High Performance Organic Coating: Fluoropolymer coating system complying with complying with AAMA 2604 minimum two-coat with minimum 70 percent polyvinylidene fluoride resin.

2. Color: As selected from manufacturer's standard colors.

B. Apply one coat of bituminous paint to concealed aluminum and steel surfaces in contact with cementitious or dissimilar materials.

C. Extent of Finishes:

1. Apply factory coating to surfaces exposed at completed assemblies.

2. Apply finish to surfaces cut during fabrication so no natural aluminum is visible in completed assemblies, including joint edges.

3. Apply touch-up materials recommended by coating manufacturer for field application to cut ends and minor damage to factory applied finish.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Verify dimensions, tolerances, and method of attachment with other work.

C. Verify wall openings and adjoining air barrier and vapor retarder materials are ready to receive work of this section.

3.2 INSTALLATION

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- A. Install Wall and Roof system in accordance with AAMA MCWM-1 - Metal Curtain Wall, Window, Store Front and Entrance - Guide Specifications Manual.
- B. Install cellular panels with cells vertical.
- C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- D. Install alignment attachments and shims to permanently fasten system to building structure.
- E. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.
- F. Provide thermal isolation where components penetrate or disrupt building insulation.
- G. Install sill and integral flashings.
- H. Coordinate attachment and seal of perimeter air and vapor retarder materials.
- I. Apply foam spray in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- J. Install perimeter sealant to method required to achieve performance criteria, with backing materials, and installation criteria in accordance with Section 07 90 00.

3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.
- C. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch (0.8 mm).
- D. Sealant Space Between Panel System Members and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

3.5 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Manufacturers' field services.
- B. Translucent panel product manufacturers to provide field surveillance of installation of their products.
- C. Monitor and report installation procedures, and unacceptable conditions.

3.6 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Remove protective material from prefinished aluminum surfaces.

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1 C. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean
2 wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3 D. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to
4 sealant manufacturer.

5 3.7 PROTECTION OF INSTALLED CONSTRUCTION

6 A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.

7 B. Protect finished Work from damage.

8 END OF SECTION

SECTION 08 71 00

DOOR HARDWARE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Hardware for fire-rated doors.
- B. Lock cylinders for doors with balance of hardware specified in other sections.
- C. Thresholds.
- D. Weatherstripping and gasketing.

1.2 RELATED REQUIREMENTS

- A. Section 081113 - Hollow Metal Doors and Frames.
- B. Section 081213 - Hollow Metal Frames.

1.3 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2019.
- C. BHMA A156.1 - Standard for Butts and Hinges 2021.
- D. BHMA A156.2 - Bored and Preassembled Locks and Latches 2017.
- E. BHMA A156.3 - Exit Devices 2020.
- F. BHMA A156.4 - Door Controls - Closers 2019.
- G. BHMA A156.5 - Cylinders and Input Devices for Locks 2020.
- H. BHMA A156.6 - Standard for Architectural Door Trim 2021.
- I. BHMA A156.7 - Template Hinge Dimensions 2016.
- J. BHMA A156.8 - Door Controls - Overhead Stops and Holders 2021.
- K. BHMA A156.13 - Mortise Locks & Latches Series 1000 2017.
- L. BHMA A156.16 - Auxiliary Hardware 2018.
- M. BHMA A156.21 - Thresholds 2019.

- 1 N. BHMA A156.22 - Standard for Gasketing 2021.
- 2 O. BHMA A156.26 - Standard for Continuous Hinges 2021.
- 3 P. BHMA A156.28 - Standard for Recommended Practices for Mechanical Keying Systems 2018.
- 4 Q. BHMA A156.115 - Hardware Preparation In Steel Doors And Steel Frames 2016.
- 5 R. BHMA A156.115W - Hardware Preparation in Wood Doors with Wood or Steel Frames 2006.
- 6 S. DHI (H&S) - Sequence and Format for the Hardware Schedule 2019.
- 7 T. DHI (KSN) - Keying Systems and Nomenclature 2019.
- 8 U. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors
- 9 and Frames 2004.
- 10 V. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors
- 11 1993; also in WDHS-1/WDHS-5 Series, 1996.
- 12 W. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- 13 X. ITS (DIR) - Directory of Listed Products current edition.
- 14 Y. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2022.
- 15 Z. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives 2022.
- 16 AA. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2022.
- 17 BB. UL (DIR) - Online Certifications Directory Current Edition.
- 18 CC. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including
- 19 All Revisions.
- 20 DD. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All
- 21 Revisions.

22 1.4 ADMINISTRATIVE REQUIREMENTS

- 23 A. Coordinate the manufacture, fabrication, and installation of products that door hardware is
- 24 installed on.
- 25 B. Sequence installation to ensure facility services connections are achieved in an orderly and
- 26 expeditious manner.
- 27 C. Preinstallation Meeting: Convene a preinstallation meeting one week prior to commencing work
- 28 of this section; require attendance by affected installers and the following:
 - 29 1. Architect.
 - 30 2. Installer's Architectural Hardware Consultant (AHC).
 - 31 3. Hardware Installer.

4. Owner's Security Consultant.
- D. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- E. Keying Requirements Meeting:
 1. Attendance Required:
 - Contractor.
 - Owner.
 - Installer's Architectural Hardware Consultant (AHC).
 - Door Hardware Installer.
 - Owner's Security Consultant.
 2. Agenda:
 - 1) Establish keying requirements.
 - 2) Verify locksets and locking hardware are functionally correct for project requirements.
 - 3) Verify that keying and programming complies with project requirements.
 - 4) Establish keying submittal schedule and update requirements.
 3. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
 - Schematic diagram of preliminary key system.
 - Flow of traffic and extent of security required.
 4. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
 5. Deliver established keying requirements to manufacturers.

1.5 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: A detailed listing that includes each item of hardware to be installed on each door.
 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
 2. Comply with DHI (H&S) using door numbering scheme and hardware set numbers as indicated in Contract Documents.
 - Submit in vertical format.
 3. List groups and suffixes in proper sequence.
 4. Include complete description for each door listed.
 5. Include manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
 6. Include account of abbreviations and symbols used in schedule.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

- E. Manufacturer's qualification statement.
- F. Installer's qualification statement.
- G. Supplier's qualification statement.
- H. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- I. Keying Schedule:
 - 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.
- J. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- K. Project Record Documents: Record actual locations of concealed equipment, services, and conduit.
- L. Maintenance Materials and Tools: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Tools: One set of each special wrench or tool applicable for each different or special hardware component, whether supplied by hardware component manufacturer or not.

1.6 QUALITY ASSURANCE

- A. Standards for Fire-Rated Doors: Maintain one copy of each referenced standard on site, for use by Architect and Contractor.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of documented experience.
- D. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) to assist in work of this section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

1.8 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty: Provide manufacturer warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.

1. Closers: Five years, minimum.
2. Exit Devices: Three years, minimum.
3. Locksets and Cylinders: Three years, minimum.

PART 2 - PRODUCTS

2.1 General Requirements

A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.

B. Provide individual items of single type, of same model, and by same manufacturer.

C. Locks: Provide a lock for each door, unless it's indicated that lock is not required.

1. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's Series. As indicated in hardware sets.
2. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.
3. Strikes:
 - 1) Finish: To match lock or latch.
 - 2) Curved-Lip Strikes: Provide as standard, with extended lip to protect frame, unless otherwise indicated.
 - 3) Center Strike At Pairs of Doors: 7/8 inch (22.2 mm) lip.

D. Closers:

1. Provide door closer on each exterior door, unless otherwise indicated.
2. Provide door closer on each fire-rated and smoke-rated door.
3. Spring hinges are not an acceptable self-closing device, unless otherwise indicated.

E. Overhead Stops and Holders (Door Checks):.

1. Provide stop for every swinging door, unless otherwise indicated.
2. Overhead Stop is not required if positive stop feature is specified for door closer; positive stop feature of door closer is not an acceptable substitute for a stop, unless otherwise indicated.
3. Overhead stop is not required if a floor or wall stop has been specified for the door.

F. Drip Guards: Provide at head of outswinging exterior doors unless protected by roof or canopy directly overhead.

G. Thresholds:

1. Exterior Applications: Provide at each exterior door, unless otherwise indicated.

H. Weatherstripping and Gasketing:

1. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated.
2. Provide door bottom sweep on each exterior door, unless otherwise indicated.

I. Fasteners:

1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
 - 1) Aluminum fasteners are not permitted.
 - 2) Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
2. Provide machine screws for attachment to reinforced hollow metal and aluminum frames.

Self-drilling (Tek) type screws are not permitted.
3. Provide stainless steel machine screws and lead expansion shields for concrete and masonry substrates.
4. Provide wall grip inserts for hollow wall construction.
5. Fire-Resistance-Rated Applications: Comply with NFPA 80.
 - 1) Provide wood or machine screws for hinges mortised to doors or frames, strike plates to frames, and closers to doors and frames.
 - 2) Provide steel through bolts for attachment of surface mounted closers, hinges, or exit devices to door panels unless proper door blocking is provided.

2.2 PERFORMANCE Requirements

A. Provide door hardware products that comply with the following requirements:

1. Applicable provisions of federal, state, and local codes.
2. Accessibility: ADA Standards and ICC A117.1.
3. Fire-Resistance-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
4. Hardware on Fire-Resistance-Rated Doors: Listed and classified by UL (DIR), ITS (DIR), or testing firm acceptable to authorities having jurisdiction as suitable for application indicated.
5. Hardware for Smoke and Draft Control Doors (Indicated as "S" on Drawings): Provide door hardware that complies with local codes, and requirements of assemblies tested in accordance with UL 1784.
6. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
7. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
8. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.

2.3 HINGES

A. Manufacturers: Conventional butt hinges. See drawings for basis of design or provide equal by one of the following.

1. BEST; dormakaba Group: www.bestaccess.com/#sle.
2. Bommer.

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3. Hager.
- B. Properties:
1. Butt Hinges: As applicable to each item specified.
 - 1) Standard Weight Hinges: Minimum of two (2) permanently lubricated non-detachable bearings.
 - 2) Heavy Weight Hinges: Minimum of four (4) permanently lubricated bearings on heavy weight hinges.
 - 3) Template screw hole locations.
 - 4) Bearing assembly installed after plating.
 - 5) Bearings: Exposed fully hardened bearings.
 - 6) Bearing Shells: Shapes consistent with barrels.
 - 7) Pins: Easily seated, non-rising pins.
 - a) Fully plate hinge pins.
 - b) Non-Removable Pins: Slotted stainless steel screws.
 - a. UL 10C listed for fire-resistance-rated doors.
 2. Continuous Hinges: As applicable to each item specified.
 - 1) Geared Continuous Hinges: As applicable to each item specified.
 - a) Non-handed.
 - b) Anti-spinning through-fastener.
 - c) UL 10C listed for fire-resistance-rated doors.
 - Metal Door Installation: Rated up to 90 minutes.
 - Wood Door Installation: Rated up to 60 minutes.
 - d) Sufficient size to permit door to swing 180 degrees
- C. Sizes: See Door Hardware Schedule.
1. Hinge Widths: As required to clear surrounding trim.
 2. Sufficient size to allow 180 degree swing of door.
- D. Finishes: See Door Hardware Schedule.
1. Fully polish hinges; front, back, and barrel.
- E. Grades:
1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
 2. Continuous Hinges: Comply with BHMA A156.26, Grade 1.
- F. Material: Base metal as indicated for each item by BHMA material and finish designation.
- G. Types:
1. Butt Hinges: Include full mortise hinges.
 2. Continuous Hinges: Include geared hinges.
- H. Quantities:

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1. Butt Hinges: Three (3) hinges per leaves up to 90 inches (2286 mm) in height. Add one (1) for each additional 30 inches (762 mm) in height or fraction thereof.
 - 1) Hinge weight and size unless otherwise indicated in hardware sets:
 - a) For doors up to 36 inches (914 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.134 inch (3.4 mm) and a minimum of 4-1/2 inches (114 mm) in height.
 - b) For doors from 36 inches (914 mm) wide up to 42 inches (1067 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.145 inch (3.7 mm) and a minimum of 4-1/2 inches (114 mm) in height.
 - c) For doors from 42 inches (1067 mm) wide up to 48 inches (1219 mm) wide and up to 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.
 - d) For doors greater than 1-3/4 inches (44.5 mm) thick provide hinges with a minimum thickness of 0.180 inch (4.6 mm) and a minimum of 5 inches (127 mm) in height.
2. Continuous Hinges: One per door leaf.

I. Applications: At swinging doors.

1. Provide non-removable pins at out-swinging doors with locking hardware and all exterior doors.

J. Products:

1. Butt Hinges:
 - 1) Ball Bearing, Five (5) Knuckle.
2. Continuous Hinges:
 - 1) Aluminum geared hinges.

2.4 BOLTS

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. Trimco: www.trimcohardware.com/#sle.
2. Ives.
3. Rockwood.

B. Properties:

1. Flush Bolts:
 - 1) Manual Flush Bolts: Manually latching upon closing of door leaf.
 - a) Bolt Throw: 3/4 inch (19 mm), minimum.
2. Dustproof Strikes: For bolting into floor, provide except at metal thresholds.

C. Options:

1. Extension Bolts: In leading edge of door, one bolt into floor, one bolt into top of frame.

D. Products:

1. Manual flush bolts.

2.5 EXIT DEVICES

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Sargent 80.
3. Von Duprin 98.

B. Properties:

1. Actuation: Crossbar.
2. Touchpads: "T" style metal touchpads and rail assemblies with matching chassis covers end caps.
3. Latch Bolts: Stainless steel deadlocking with 3/4 inch (19 mm) projection using latch bolt.
4. Lever Design: Match project standard lockset trims.
5. Cylinder: Include where cylinder dogging or locking trim is indicated.
6. Strike as recommended by manufacturer for application indicated.
7. Sound dampening on touch bar.
8. Dogging:
 - 1) Non-Fire-Resistance-Rated Devices: Cylinder 1/4 inch (6 mm) and hex key dogging.
 - 2) Fire-Resistance-Rated Devices: Manual dogging not permitted.
9. Touch bar assembly on wide style exit devices to have a 1/4 inch (6.3 mm) clearance to allow for vision frames.
10. All exposed exit device components to be of architectural metals and "true" architectural finishes.
11. Handing: Field-reversible.
12. Fasteners on Back Side of Device Channel: Concealed - exposed fasteners not allowed.
13. Vertical Latch Assemblies' Operation: Gravity, without use of springs.

C. Grades: Complying with BHMA A156.3, Grade 1.

1. Provide exit devices tested and certified by UL or by a recognized independent laboratory for mechanical operational testing to 10 million cycles minimum with inspection confirming Grade 1 Loaded Forces have been maintained.

D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

E. Products:

1. 2000.

2.6 LOCK CYLINDERS

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties:

1. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
 - 1) Provide cylinders from same manufacturer as locking device.
 - 2) Provide cams and/or tailpieces as required for locking devices.
 - 3) Provide cylinders with appropriate format interchangeable cores where indicated.

C. Grades:

1. Standard Security Cylinders: Comply with BHMA A156.5.

D. Material:

1. Manufacturer's standard corrosion-resistant brass alloy.

E. Types: As applicable to each item specified.

1. Standard security small format interchangeable core (SFIC) type cylinders, with seven-pin, 6C cores.

F. Applications: At locations indicated in hardware sets, and as follows

1. As required for items with locking devices provided by other sections, including at elevator controls and cabinets.
 - 1) When provisions for lock cylinders are referenced elsewhere in the Project Manual to this Section, provide compatible type of lock cylinder, keyed to building keying system, unless otherwise indicated.

G. Products:

1. Rim/mortise.

2.7 MORTISE LOCKS

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties:

1. Mechanical Locks: Manufacturer's standard.
 - 1) Fitting modified ANSI A115.1 door preparation.
 - 2) Door Thickness Coordination Fitting 1-3/4 inch (44 mm) to 2-1/4 inch (57 mm) thick doors.

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- 3) Latch: Solid, one-piece, anti-friction, self-lubricating stainless steel.
- 4) Latchbolt Throw: 3/4 inch (19 mm), minimum.
- 5) Auxiliary Deadlatch: One piece stainless steel, permanently lubricated.
- 6) Backset: 2-3/4 inch (70 mm).
- 7) Lever Trim:
 - a) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.
 - b) Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs (158.2 Nm) of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
 - c) Spindle: Designed to prevent forced entry from attacking of lever.
 - d) Independent spring mechanism for each lever.
Trim to be self-aligning and thru-bolted.
 - e) Handles: Made of forged or cast brass, bronze, or stainless steel construction. Levers that contain a hollow cavity are not acceptable.
 - f) Levers to operate a roller bearing spindle hub mechanism.

C. Finishes: See Door Hardware Schedule.

1. Core Faces: Match finish of lockset.

D. Grades:

1. Comply with BHMA A156.13, Grade 1, Security; Grade 2.

E. Options:

1. Provide locksets made in a manufacturing facility to compliant with ISO 9001-Quality Management and ISO 14001-Environmental Management.

F. Products: Mortise locks, including standard and electrified types.

G. 40H.

2.8 CYLINDRICAL LOCKS

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties:

1. Mechanical Locks:
 - 1) Fitting modified ANSI A115.2 door preparation.
 - 2) Door Thickness Fit: 1-3/8 inches (35 mm) to 2-1/4 inches (57 mm) thick doors.
 - 3) Construction: Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.
 1. Through-bolted anti-rotational studs.

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- 4) Cast stainless steel latch retractor with roller bearings for exceptionally smooth operation and superior strength and durability.
 - 5) Bored Hole: 2-1/8 inch (54 mm) diameter.
 - 6) Backset: 2-3/4 inches (70 mm) unless otherwise indicated.
 - 7) Latch: Single piece tail-piece construction.
 - 8) Latchbolt Throw: 9/16 inch (14.3 mm), minimum.
 - 9) Cylinders:
 - a) Cylinder Core Types: Locks capable of supporting manufacturers' cores, as applicable.
 - 10) Small format interchangeable.
 - 11) Lever Trim:
 2. Style: See Door Hardware Schedule.
 - a) Functionality: Allow the lever handle to move up to 45 degrees from horizontal position prior to engaging the latchbolt assembly.
 - b) Strength: Locksets outside locked lever designed to withstand minimum 1,400 inch-lbs (158.2 Nm) of torque. In excess of that, a replaceable part will shear. Key from outside and/or inside lever will still operate lockset.
 - c) Independent spring mechanism for each lever.
 - 12) Contain lever springs in the main lock hub.
 - a) Outside Lever Sleeve: Seamless one-piece construction.
 - b) Keyed Levers: Removable only after core is removed by authorized control key.
- C. Finishes: See Door Hardware Schedule.
1. Core Faces: Match finish of lockset.
- D. Grades: Comply with BHMA A156.2, Grade 1, Series 4000, Operational Grade 1, Extra Heavy Duty.
1. Durability: Passing 50 Million cycle tests verified by third party testing agency.
- E. Material: Manufacturer's standard for specified lock.
1. Critical Latch and Chassis Components: Brass or corrosion-resistance treated steel.
 2. Outside Lever Sleeve: Hardened steel alloy.
- F. Options:
1. Regulatory Compliance: As required by authorities having jurisdiction the State in which the Project is located.
- G. Products: Cylindrical locks, including mechanical and electrified types.
1. 9K (Grade 1).

2.9 CLOSERS

- A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

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1. BEST, dormakaba Group www.bestaccess.com/#sle.
2. LCN 4041.
3. Norton 7500.

B. Properties:

1. Surface Mounted Closers: Manufacturer's standard.
 - 1) Construction: R14 high silicon aluminum alloy.
 - 2) Maximum Projection from Face of Door: 2-7/16 inches (62 mm).
 - 3) Mechanism: Separate tamper-resistant adjusting valves for closing and latching speeds.
 - a) Include advanced backcheck feature.
 - b) Include delayed action feature.
 - 4) Hydraulic Fluid: All-weather type.
 - 5) Arm Assembly: Standard for product specified.
 - a) Include hold-open, integral stop, or spring-loaded stop feature, as specified in Door Hardware Schedule.
 - b) Parallel arm to be a heavy-duty rigid arm.
 - c) Where "IS" or "S-IS" arms are specified in hardware sets, if manufacturer does not offer this arm provide a regular arm mount closer in conjunction with a heavy-duty overhead stop equal to a dormakaba 900 Series.
 - 6) Covers:
 - a) Type: Standard for product selected.
 - a. Full.
 - b) Material: Plastic.
 - c) Finish: Painted.

C. Grades:

1. Closers: Comply with BHMA A156.4, Grade 1.
 - 1) Underwriters Laboratories Compliance:
 - a) Product Listing: UL (DIR) and ULC for use on fire-resistance-rated doors.
 - 2) UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.

D. Code Compliance: As required by authorities having jurisdiction in the State in which the Project is located.

1. Devices listed with California Department of Forestry and Fire Protection, Office of the State Fire Marshal.

E. Types:

1. Rack-and-pinion, surface-mounted. 1-1/2 inches (38 mm) minimum bore.

F. Installation:

1. Mounting: Includes surface mounted installations.
2. Mount closers on non-public side of door and stair side of stair doors unless otherwise noted in hardware sets.

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3. At outswinging exterior doors, mount closer on interior side of door.
4. Provide adapter plates, shim spacers, and blade stop spacers as required by frame and door conditions.
5. Where an overlapping astragal is included on pairs of swinging doors, provide coordinator to ensure door leaves close in proper order.

G. Products:

1. Surface Mounted:
 - 1) HD8000.

2.10 OVERHEAD STOPS AND HOLDERS

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. dormakaba; dormakaba Group: www.dormakaba.com/us-en/#sle.
2. Architectural Builders Hardware Mfg (ABH).
3. Rixson.

B. Properties:

1. Stop Settings: At 90 degrees opening.

C. Sizes: Manufacturer's standard for the application.

D. Finishes:

1. Arms and Brackets: Zinc-plated.

E. Grades: As applicable to item specified.

1. Comply with BHMA A156.8, Grade 1.

F. Material: Base metal as indicated for each item by BHMA material and finish designation.

1. Track Channel: Extruded aluminum alloy.
2. Slide Block: Machined from solid brass alloy.

G. Types:

1. Surface-applied.

H. Products:

1. Surface Overhead Stops and Holders:
 - 1) 900 Heavy Duty.

2.11 PROTECTION PLATES

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. Trimco: www.trimcohardware.com/#sle.

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- 1 2. Ives.
- 2 3. Rockwood.

3 B. Properties:

4 1. Plates:

- 5 1) Kick Plates: Provide along bottom edge of push side of every door with
- 6 closer, except aluminum storefront and glass entry doors, unless otherwise
- 7 indicated.
- 8 2) Mop Plates: Provide along bottom edge of pull side of doors to provide
- 9 protection from cleaning liquids and equipment damage to door surface.
- 10 3) Edges: Beveled, on four (4) unless otherwise indicated.

11 C. Grades: Comply with BHMA A156.6.

12 D. Material: As indicated for each item by BHMA material and finish designation.

13 1. Metal Properties: Stainless steel.

- 14 1) Metal, Standard Duty: Thickness 0.050 inch (1.27 mm), minimum.

15 E. Installation:

- 16 1. Fasteners: Countersunk screw fasteners

17 F. Products:

- 18 1. Kick/Mop Plate.

19 2.12 STOPS AND HOLDERS

20 A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

- 21 1. Trimco: www.trimcohardware.com/#sle.
- 22 2. Ives.
- 23 3. Rockwood.

24 B. General: Provide overhead stop/holder when wall or floor stop is not feasible.

25 C. Grades:

- 26 1. Wall Bumpers: Comply with BHMA A156.16 and Resilient Material Retention
- 27 Test as described in this standard.

28 D. Material: Base metal as indicated for each item by BHMA material and finish designation.

29 E. Types:

- 30 1. Wall Bumpers: Bumper, concave, convex, wall stop.

31 F. Installation:

1. Non-Masonry Walls: Confirm adequate wall reinforcement has been installed to allow lasting installation of wall bumpers.

G. Products:

1. Wall Bumpers.

2.13 THRESHOLDS

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. National Guard Products, Inc: www.ngpinc.com/#sle.
2. Pemko.
3. Reese.

B. Properties:

1. Threshold Surface: Fluted horizontal grooves across full width.

C. Grades: Thresholds: Comply with BHMA A156.21.

D. Types: As applicable to project conditions. Provide barrier-free type at every location where specified.

1. Bumper Seal Thresholds with Gasket: Use silicone gaskets.

E. Products:

1. Threshold.

2.14 WEATHERSTRIPPING AND GASKETING

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. National Guard Products, Inc: www.ngpinc.com/#sle.
2. Pemko.
3. Reese.

B. Properties:

1. Weatherstripping Air Leakage Performance: Not exceeding 0.3 cfm/sq ft of door opening at 0.3 inches of water pressure differential for single doors, and 0.5 cfm/sq ft of door area at 0.3 inches of water pressure differential for double doors for gasketing other than smoke control, as tested according to ASTM E283/E283M; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
2. Rigid, Housed, Perimeter Gasketing: Silicone bulb gasket material held in place by aluminum housing; fastened to frame stop with screws.
3. Door Sweeps: Silicone gasket material held in place by flat aluminum housing or flange; surface mounted to face of door with screws.

C. Grades: Comply with BHMA A156.22.

D. Products:

1. Weatherstripping: See Door Hardware Schedule.
2. Door Bottom Seals:
 - 1) Door Sweeps: See Door Hardware Schedule.

2.15 MISCELLANEOUS ITEMS

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties:

1. Padlocks: Solid extruded brass case with shackle that locks at heel and toe.
 - 1) Shackle Height: 1-1/2 inch (38 mm), and width of opening is 7/8 inch (22.2 mm).
 - 2) Shackle Material: Stainless steel.
 - 3) Shackle Diameter: 5/16 inch (7.9 mm).
 - 4) Finish: 626 - Satin Chrome.
 - 5) Keying: 7-pin SFIC (Small Format Interchangeable Core).
 - 6) Lock Functions:
 - a) Non-key retained (L).

C. Grades: As applicable to each item specified.

1. Padlocks:
 - 1) Meet ASTM F883 Grade 4 with stainless steel shackle.

D. Products:

1. Padlocks:
 - 1) 21B.

2.16 Keys and Cores

A. Manufacturers: See drawings for basis of design or provide equal by one of the following.

1. BEST, dormakaba Group: www.bestaccess.com/#sle.
2. Substitutions: Not permitted.

B. Properties: Complying with guidelines of BHMA A156.28.

1. Provide small format interchangeable core.
2. Provide Standard keys and cores.
3. Provide keying information in compliance with DHI (KSN) standards.
4. Keying Schedule: Arrange for a keying meeting, with Architect, Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying complies with project requirements.
5. Keying: Master keyed.

6. Include construction keying and control keying with removable core cylinders.
7. Supply keys in following quantities:
 - 1) Master Keys: 4 each.
 - 2) Construction Master Keys: 6 each.
 - 3) Construction Keys: 15 each.
 - 4) Construction Control Keys: 2 each.
 - 5) Control Keys if New System: 2 each.
8. Provide key collection envelopes, receipt cards, and index cards in quantity suitable to manage number of keys.
9. Deliver keys with identifying tags to Owner by security shipment direct from manufacturer.
10. Permanent Keys and Cores: Stamped with applicable key marking for identification. Do not include actual key cuts within visual key control marks or codes. Stamp permanent keys "Do Not Duplicate."
11. Include installation of permanent cores and return construction cores to hardware supplier. Construction cores and keys to remain property of hardware supplier.

C. Products:

1. Standard TB Keyway.

2.17 FINISHES

- A. Finishes: Identified in Hardware Sets.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.
- B. Correct all defects prior to proceeding with installation.
- C. Verify that electric power is available to power operated devices and of correct characteristics.

3.2 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware using the manufacturer's fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.
- C. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- D. Install hardware for smoke and draft control doors in accordance with NFPA 105.
- E. Use templates provided by hardware item manufacturer.
- F. Do not install surface mounted items until application of finishes to substrate are fully completed.

- 1 G. Wash down masonry walls and complete painting or staining of doors and frames.
- 2 H. Complete finish flooring prior to installation of thresholds.
- 3 I. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware
4 item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on
5 drawings.
- 6 1. For Steel Doors and Frames: Install in compliance with DHI (LOCS)
7 recommendations.
- 8 2. For Steel Doors and Frames: See Section 6549.
- 9 3. For Steel Door Frames: See Section 081213.
- 10 4. For Aluminum-Framed Storefront Doors and Frames: See Section 084313.
- 11 5. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
- 12 6. Flush Wood Doors: See Section 081416.
- 13 7. Stile and Rail Wood Doors: See Section 081433.
- 14 8. Mounting heights in compliance with ADA Standards:
- 15 a. Locksets: 40-5/16 inch (1024 mm).
- 16 b. Push Plates/Pull Bars: 42 inch (1067 mm).
- 17 c. Deadlocks (Deadbolts): 48 inch (1219 mm).
- 18 d. Exit Devices: 40-5/16 inch (1024 mm).
- 19 e. Door Viewer: 43 inch (1092 mm); standard height 60 inch (1524 mm).
- 20 J. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact
21 with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk
22 screws.
- 23 K. Include in installation for existing doors and frames any necessary field modification and field
24 preparation of doors and frames for new hardware. Provide necessary fillers, reinforcements, and
25 fasteners for mounting new hardware and to cover existing door and frame preparations.
- 26 3.3 FIELD QUALITY CONTROL
- 27 A. Perform field inspection and testing under provisions of Section 014000 - Quality Requirements.
- 28 3.4 ADJUSTING
- 29 A. Adjust work under provisions of Section 017000 - Execution and Closeout Requirements.
- 30 B. Adjust hardware for smooth operation.
- 31 C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.
- 32 3.5 CLEANING
- 33 A. Clean finished hardware in accordance with manufacturer's written instructions after final
34 adjustments have been made.
- 35 B. Replace items that cannot be cleaned to manufacturer's level of finish quality at no additional
36 cost.

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1 3.6 PROTECTION

2 A. Protect finished Work under provisions of Section 017000 - Execution and Closeout
3 Requirements.

4 B. Do not permit adjacent work to damage hardware or finish.

5 C. Manufacturer List

6 D. Code Name

7	BE	Best Access Systems
8	DM	Dorma Door Controls
9	NA	National Guard
10	PR	BEST Precision Exit Devices
11	ST	BEST Hinges and Sliding
12	TR	Trimco

13 E. Option List

14	Code	Description
15	1/4-20 SSMS/EA	STAINLESS MACHINE SCREWS/EXPANSION ANC.
16	B4E-HEAVY-KP	BEVELED 4 EDGES - KICK PLATES
17	CD	CYLINDER DOGGING
18	CSK	COUNTER SINKING OF KICK and MOP PLATES
19	LAR	LENGTH AS REQUIRED
20	LDW	LESS DOOR WIDTH
21	VIB	Double Visual Indicator Option

22 F. Finish List

23	Code	Description
24	26D	Satin Chrome
25	626	Satin Chromium Plated
26	626E	Satin Chrome
27	630	Satin Stainless Steel
28	689	Aluminum Painted
29	AL	Aluminum

30 END OF SECTION

SECTION 08 80 00

GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Glass and glazing for metal frames, doors, windows, and glazed walls.

B. Related Sections:

1. Section 07 90 00 - Joint Protection: Sealant and back-up material other than glazing sealants.
2. Section 08 13 14 - Standard Steel Doors: Glazed doors.
3. Section 08 36 13 - Sectional Doors.

1.2 REFERENCES

A. American National Standards Institute:

1. ANSI Z97.1 - Safety Glazing Materials Used in Buildings Safety.

B. American Society of Civil Engineers:

1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

C. ASTM International:

1. ASTM C509 - Standard Specification for Elastomeric Cellular Preformed Gasket and Sealing Material.
2. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
3. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
4. ASTM C1036 - Standard Specification for Flat Glass.
5. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.
6. ASTM C1193 - Standard Guide for Use of Joint Sealants.
7. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.

- 1 9. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and
2 Evaluation.

3 D. Consumer Products Safety Commission:

- 4 1. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing.

5 E. Glass Association of North America:

- 6 1. GANA - Sealant Manual.
7 2. GANA - Glazing Manual.
8 3. GANA - Laminated Glass Design Guide.

9 F. National Fenestration Rating Council Incorporated:

- 10 1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.
11 2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain
12 Coefficient and Visible Transmittance at Normal Incidence.

13 G. National Fire Protection Association:

- 14 1. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

15 H. South Coast Air Quality Management District:

- 16 1. SCAQMD Rule 1168 - Adhesive and Sealant Applications.

17 I. Underwriters Laboratories Inc.:

- 18 1. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
19 2. UL - Building Materials Directory.

20 1.3 PERFORMANCE REQUIREMENTS

21 A. Provide glass and glazing materials for continuity of building enclosure vapor retarder and
22 air barrier:

- 23 1. In conjunction with materials described in Section 07 26 00, and 07 90 00.
24 2. To utilize inner pane of multiple panes sealed units for continuity of air barrier and
25 vapor retarder seal.
26 3. To maintain continuous air barrier and vapor retarder throughout glazed assembly
27 from glass pane to heel bead of glazing sealant. 24

28 B. Glass Thickness: Select minimum thickness in accordance with ASTM E1300 to resist
29 specified design loads with the following maximum probability of breakage:

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1. Vertical Glass: 8 lites per 1000 for wind loads with 60 seconds maximum load duration.
 2. Minimum Thickness: 1/4 inch for exterior glass.
 - C. Structural Design: Design in accordance with applicable code for most critical combination of wind, snow, seismic, and dead loads.
 - D. Wind Loads: Design and size glass to withstand positive and negative wind loads acting normal to plane of wall, including increased loads at building corners.
 1. Design Wind Load: As calculated in accordance with applicable code and ASCE 7.
 - E. Wind-Borne Debris Loads: Design and size glass located less than 60 feet above grade to withstand the following loads:
 1. Glass Within 30 feet of Grade: ASTM E1886 and ASTM E1996; large missile impact test.
 2. Glass Greater than 30 feet above Grade: ASTM E1886 and ASTM E1996; small missile impact test.
 - F. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with applicable code.
 - G. Exterior Glass Deflection: Maximum of 1/175 of glass edge length or 3/4 inch, whichever is less with full recovery of glazing materials.
 - H. Interior Glass Deflection: Maximum differential deflection for two adjacent unsupported edges when 50 plf force is applied to one panel at any point up to 42 inches above finished floor less than thickness of glass.
 - I. Thermal and Solar Optical Performance: Measured or calculated in accordance with the following:
 1. Maximum U-Values: Comply with ICC IECC for climate zone in which project is located. Measure in accordance with AAMA 1503.
 2. Maximum SHGC: Comply with ICC IECC for climate zone in which project is located. Measure in accordance with NFRC 200.
 3. Solar Optical Properties: NFRC 300.
- 1.4 SUBMITTALS
- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
 - B. Shop Drawings: Signed and sealed by professional engineer.
 1. Indicate sizes, layout, thicknesses, and loading conditions for glass.

C. Product Data:

1. Glass: Provide structural, physical, and thermal and solar optical performance characteristics, size limitations, special handling or installation requirements.
2. Glazing Sealants, Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors where exposed.

D. Design Data: Signed and sealed by professional engineer.

1. Submit design calculations for glass thicknesses.

E. Samples:

1. Glass: Submit two samples 12x12 inch in size, illustrating each unit's coloration and design.
2. Glazing Materials: Submit bead of glazing sealant and gaskets, color as selected by architect.

F. Manufacturer's Certificate: Certify sealed insulating glass, meets or exceeds specified requirements.

G. Installer's Certificate: Certify glass furnished without identification label is installed in accordance with Construction Documents and applicable code.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual for glazing installation methods.

B. Light Transmitting Plastics: Class CC1 defined by applicable code when tested in accordance with ASTM D635 in thickness for intended use.

1. Self-Ignition Temperature: Minimum 650 degrees F when tested in accordance with ASTM D1929.

2. Smoke Developed Index: Maximum 450 when tested in accordance with ASTM E84 or maximum 75 when tested in accordance with ASTM D2843 in thickness for intended use.

D. Perform Work in accordance with State of Ohio standard.

1.7 QUALIFICATIONS

A. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

B. Design glass under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Ohio.

1.8 WARRANTY

A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

B. Furnish five-year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

PART 2 PRODUCTS

2.1 FLOAT GLASS MATERIALS

A. Annealed Glass: ASTM C1036, Type 1 transparent flat, Quality Q3, float glass.

1. Furnish annealed glass except where heat strengthened or tempered glass is required to meet specified performance requirements.

B. Heat Strengthened Glass: ASTM C1048, Type 1 transparent flat, Quality Q3, Kind HS heat strengthened, Condition A uncoated, float glass.

1. Furnish heat strengthened glass where annealed glass cannot meet specified performance requirements.

C. Tempered Glass: ASTM C1048, Type 1 transparent flat, Quality Q3, Kind FT fully tempered, Condition A uncoated, float glass with horizontal tempering.

1. Furnish tempered glass where heat strengthened glass cannot meet specified performance requirements.

2. Furnish tempered glass conforming to CPSC 16 CFR 1201 Category II at locations where safety glass is required by 2007 Ohio Building code and indicated on drawings.

2.2 FLOAT GLASS PRODUCTS

A. Clear Glass: Annealed, Heat strengthened, and Tempered float glass as specified; Class 1 clear.

1. Clear annealed glass (FG-CA).

2. Clear heat strengthened glass (FG-CH).

3. Clear tempered glass (FG-CT).

4. Minimum Thickness: 1/4 inch.

B. Tinted Glass: Annealed, Heat strengthened, and Tempered float glass as specified; Class 2 tinted.

1. Tint: Green.

2. Visible Light Transmittance: 54 percent minimum.

3. Solar Heat Gain Coefficient: .31 maximum.

4. Exterior glass of insulated window.
- C. Low E Glass: Annealed, Heat strengthened, and Tempered float glass as specified; Class 2 tinted.
 1. Tint: Clear.
 2. Coating: ASTM C1376; pyrolytic.
 3. Solar Light Transmittance: 52 percent minimum.
 4. Solar Heat Gain Coefficient: .31 maximum.
 5. Interior glass of insulated window.

2.3 INSULATING GLASS PRODUCTS

- A. Insulating Glass: ASTM E2190 certified by Insulating Glass Certification Council and Insulating Glass Manufacturers Alliance; with glass elastomer edge seal; place reflective film within unit; purge interpane space with dry air.
 1. Total Unit Thickness: 1 inch.
 2. Insulating Glass Unit Edge Seal Construction: Aluminum, thermally broken, bent and soldered corners.
 3. Insulating Glass Unit Edge Seal Material: Black color.
 4. U-Factor Winter: .29 maximum.
 5. U-Factor Summer: .27 maximum.
 6. Solar Heat Gain Coefficient: .31 maximum.
 7. UV Transmittance: 38% maximum.
 8. Visible Light Transmittance: 54% minimum.
 9. Solar Transmittance: 52% maximum.
 10. Reflectance Inside: 16% maximum.
 11. Reflectance Outside: 9% maximum.

2.4 GLAZING SEALANTS

- A. Elastomeric Glazing Sealants: Materials compatible with adjacent materials including glass, laminated glass core, insulating glass seals, and glazing channels.
 1. Silicone Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component; chemical curing; capable of

water immersion without loss of properties; non-bleeding, non-staining, cured Shore A hardness of 15 to 25.

- a. Color: As selected by architect (MATCH EXISTING GLAZING).
- b. Structural Silicone: Furnish high-modulus structural silicone glazing materials where sealant bonds glass to substrate.
- c. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

2. Polyurethane Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component, chemical curing, non-staining, non-bleeding, Shore A Hardness Range 20 to 35.

- a. Color: As selected by architect.
- b. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

B. Pre-Formed Glazing Tape: Size to suit application.

1. Preformed butyl compound with integral resilient tube spacing device; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.

- a. Butyl Corner Sealant: ASTM C920 single component non-skinning butyl compatible with glazing tape; color to match tape.
- b. Interior Sealants and Sealant Primers: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.
- c. Interior Adhesives: Maximum volatile organic compound content in accordance with SCAQMD Rule 1168.

2.5 GLAZING ACCESSORIES

A. Setting Blocks: Elastomeric material recommended by glass manufacturer, 80 to 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4-inch x width of glazing rabbet space minus 1/16-inch x height to suit glazing method and pane weight and area.

B. Spacer Shims: Elastomeric material recommended by glass manufacturer, 50 to 60 Shore A durometer hardness, minimum 3-inch-long x one half the height of glazing stop x thickness to suit application, self-adhesive on one face.

C. Fire-Resistant Glazing Materials: Materials used to obtain required fire-resistant rating.

D. Smoke Removal Unit Targets: Adhesive targets affixed to glass to identify glass units destined for removal for smoke control.

2.6 SOURCE QUALITY CONTROL AND TESTS

A. Provide testing and analysis of glass to Section 01 40 00.

B. Provide shop inspection and testing for safety glass.

- C. Test insulating glass samples in accordance with ASTM E2190.
- D. Heat soak tempered glass in accordance with DIN 18516-4.
 - 1. Statistical Heat Soaking: Heat soak statistical sampling each type of tempered glass to ensure 95 percent probability of maximum 0.1 percent glass breakage caused by nickel sulfide inclusions.
 - 2. Full Heat Soaking: Heat soak each tempered glass lite before final fabrication.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify openings for glazing are correctly sized and within acceptable tolerance.
- C. Verify surfaces of glazing channels or recesses are clean, free of obstructions impeding moisture movement, weeps are clear, and ready to receive glazing.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION

- A. Perform installation in accordance with GANA Glazing Manual.
 - 1. Glazing Sealants: Comply with ASTM C1193.
- B. Exterior Wet/Dry Method (Preformed Tape and Sealant) Installation:
 - 1. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with compatible butyl sealant.
 - 2. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapor seal.
 - 3. Place setting blocks at ¼ points with edge block no more than 6 inches from corners.
 - 4. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
 - 5. Install removable stops, with spacer strips inserted between glazing and applied stops, ¼ inch below sight line.

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6. Fill gap between glazing and stop with elastomeric glazing sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
7. Apply cap bead of elastomeric glazing sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.
- C. Exterior Wet Method (Sealant and Sealant) Installation:
 1. Place setting blocks at 1/4 points and install glazing pane or unit.
 2. Install removable stops with glazing centered in space by inserting spacer shims both sides at 24 inches intervals, 1/4 inch below sight line.
 3. Fill gaps between glazing and stops with elastomeric glazing sealant to depth of bite on glazing, but not more than 3/8 inch below sight line to ensure full contact with glazing and continue the air and vapor seal.
 4. Apply sealant to uniform line, flush with sight line. Tool or wipe sealant surface smooth.
- D. Interior Dry Method (Tape and Tape) Installation:
 1. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
 2. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
 3. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
 4. Place glazing tape on free perimeter of glazing in same manner described above.
 5. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
 6. Knife trim protruding tape.

3.4 MANUFACTURER'S FIELD SERVICES

- A. Section 01 40 00 - Quality Requirements: Manufacturers' field services.
- B. Glass and glazing product manufacturers to provide field surveillance of installation.
- C. Monitor and report installation procedures, and unacceptable conditions.

3.5 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.

1 C. Clean glass and adjacent surfaces.

2 3.6 PROTECTION OF INSTALLED CONSTRUCTION

3 A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.

4 B. After installation, mark pane with an 'X' by using removable plastic tape or paste.

5 END OF SECTION

SECTION 09 90 00

PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following substrates:

1. Concrete floors.
2. Concrete Masonry Units
3. Steel.
4. Galvanized metal.
5. Aluminum
6. Wood.
7. Gypsum board.

- B. Related Sections include the following:

1. Division 5 Sections for shop priming of metal substrates with primers specified in this Section.
2. Division 6 Sections for shop priming carpentry with primers specified in this Section.
3. Division 8 Sections for factory priming windows and doors with primers specified in this Section.
4. Division 9 Section "Wood Stains and Transparent Finishes" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

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.

- C. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
 3. Final approval of color selections will be based on benchmark samples.
 - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.6 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of Design Manufacturer: Subject to compliance with requirements, provide products by Valspar Metal Panel Building Siding And Roof Finish Paint, or equal products by one of the following:

1. Sherwin Williams
2. Benjamin Moore & Co.
3. Duron, Inc.
4. PPG Architectural Finishes, Inc.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. 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.

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- 1 n. Formaldehyde.
- 2 o. Hexavalent chromium.
- 3 p. Isophorone.
- 4 q. Lead.
- 5 r. Mercury.
- 6 s. Methyl ethyl ketone.
- 7 t. Methyl isobutyl ketone.
- 8 u. Methylene chloride.
- 9 v. Naphthalene.
- 10 w. Toluene (methylbenzene).
- 11 x. 1,1,1-trichloroethane.
- 12 y. Vinyl chloride.

13 C. Colors: As indicated on Wall Materials legend on drawings..

14 2.3 BLOCK FILLERS

15 A. Interior/Exterior Latex Block Filler: MPI #4.

16 2.4 PRIMERS/SEALERS

17 A. Interior Latex Primer/Sealer: MPI #50.

18 2.5 METAL PRIMERS

19 A. Rust-Inhibitive Primer (Water Based): MPI #107.

20 B. Waterborne Galvanized-Metal Primer: MPI #134.

21 2.6 WOOD PRIMERS

22 A. Interior Latex-Based Wood Primer:

23 2.7 LATEX PAINTS

24 A. Interior Latex (Flat): MPI #53 (Gloss Level 1).

25 B. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).

26 C. Interior Latex (Satin): MPI #43 (Gloss Level 4).

27 D. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).

28 E. Interior Latex (Gloss): MPI #114 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).

29 F. High Performance Laytex Gloss and Semi-Gloss

1 2.8 PRECATALYZED EPOXY

- 2 A. Waterbased Epoxy

3 2.9 DRY FOG/FALL COATINGS

- 4 A. Waterborne Dry Fall: MPI #133.

5 2.10 FLOOR COATINGS

- 6 A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.

- 7 B. Interior/Exterior Latex Floor (Low Gloss): MPI #60 (maximum Gloss Level 3).

8 PART 3 - EXECUTION

9 3.1 EXAMINATION

- 10 A. Examine substrates and conditions, with Applicator present, for compliance with requirements
11 for maximum moisture content and other conditions affecting performance of work.

- 12 B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as
13 follows:

- 14 1. Concrete: 12 percent.
15 2. Masonry (Clay and CMU): 12 percent.
16 3. Wood: 15 percent.
17 4. Gypsum Board: 12 percent.

- 18 C. Verify suitability of substrates, including surface conditions and compatibility with existing
19 finishes and primers.

- 20 D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces
21 are dry.

- 22 1. Beginning coating application constitutes Contractor's acceptance of substrates and
23 conditions.

24 3.2 PREPARATION

- 25 A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural
26 Painting Specification Manual" applicable to substrates indicated.

- 27 B. Remove plates, machined surfaces, and similar items already in place that are not to be painted.
28 If removal is impractical or impossible because of size or weight of item, provide surface-applied
29 protection before surface preparation and painting.

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1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.

G. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

H. Aluminum Substrates: Remove surface oxidation.

I. Wood Substrates:

1. Sand surfaces that will be exposed to view, and dust off.
2. Prime edges, ends, faces, undersides, and backsides of wood.
3. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

J. 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. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Mechanical and Electrical Work: Paint items exposed in 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.
 - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
 - 2. Electrical Work:
 - a. Electrical equipment that is indicated to have a factory-primed finish for field painting.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

Morse Road Transfer Station, Columbus, OH

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Basis of Design Manufacturer: Sherwin Williams. Products as listed below.
- B. Concrete Substrates, Traffic Surfaces:
 - 1. Water Based Acrylic Floor System (pigmented): Mechanical Rooms, Janitor Closet, Recycling/Storage, Garage Office Floors.
 - a. Prime Coat: SW ArmorSeal Tread-Plex WB Acrylic Coating, 100 g/l.
 - b. Topcoat: SW ArmorSeal Tread-Plex WB Acrylic Coating, 100 g/l.
 - 2. Water-Based Clear Sealer System: Garage Floor
 - a. First Coat: Interior/exterior clear concrete floor sealer (water based).
 - b. Topcoat: Interior/exterior clear concrete floor sealer (water based).
- C. CMU Substrates:
 - 1. Laytex System; Mechanical Roomswalls
 - a. Prime Coat: SW PrepRite Block Filler, 50 g/l.
 - b. Intermediate Coat: SW ProMar 200 Zero VOC Eg-Shel, 0g/l.
 - c. Topcoat: Interior latex SW ProMar 200 Zero VOC Eg-Shel, 0g/l.
- D. Interior Steel Substrates:
 - 1. No VOC Acrylic; steel doors and frames:
 - a. Prime Coat: SW ProIndustrial Pro-Cryl Universal Primer, 100 g/l
 - b. Intermediate Coat: SW ProIndustrial 0 VOC Acrylic Semi-Gloss, 0 g/l.
 - c. Topcoat: SW ProIndustrial 0 VOC Acrylic Semi-Gloss, 0 g/l.
 - 2. No VOC Acrylic; Steel columns, steel railings:
 - a. Prime Coat: SW ProIndustrial Pro-Cryl Universal Primer, 100 g/l
 - b. Intermediate Coat: SW ProIndustrial 0 VOC Acrylic Gloss, 0 g/l.
 - c. Topcoat: SW ProIndustrial 0 VOC Acrylic Gloss, 0 g/l.

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E. Interior Galvanized-Metal Substrates:

1. High Performance Acrylic; Steel doors and frames, bollards: SemiGloss

- a. Prime Coat: SW ProIndustrial Pro-Cryl Universal Primer,
- b. Intermediate Coat: SW Sher-Dryl HP Semi-Gloss,
- c. Topcoat: SW Sher-Dryl HP Semi-Gloss,

F. Exterior Galvanized Steel Substrates:

1. High Performance Acrylic; Steel doors and frames, bollards: SemiGloss

- a. Prime Coat: SW ProIndustrial Pro-Cryl Universal Primer,
- b. Intermediate Coat: SW Sher-Dryl HP Semi-Gloss,
- c. Topcoat: SW Sher-Dryl HP Semi-Gloss,

2. High Performance Acrylic; Steel Canopy: Gloss

- a. Prime Coat: SW ProIndustrial Pro-Cryl Universal Primer,
- b. Intermediate Coat: SW Sher-Dryl HP Gloss,
- c. Topcoat: SW Sher-Dryl HP Gloss,

G. Exterior Aluminum Substrates:

1. High Performance Acrylic; Canopy: Gloss

- a. Prime Coat: SW ProIndustrial Pro-Cryl Universal Primer,
- b. Intermediate Coat: SW Sher-Dryl HP Gloss,
- c. Topcoat: SW Sher-Dryl HP Gloss,

END OF SECTION

SECTION 10 44 00

FIRE PROTECTION SPECIALTIES

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 portable, fire extinguishers and mounting brackets for fire extinguishers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.4 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Badger Fire Protection; a Kidde company.
 - b. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - c. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
 - d. Larsen's Manufacturing Company.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Carbon Dioxide Type: UL-rated 10-B:C, 15-lb nominal capacity, with carbon dioxide in manufacturer's standard enameled-metal container.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Badger Fire Protection; a Kidde company.
 - b. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - c. Larsen's Manufacturing Company.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION

PROJECT MANUAL
MORSE ROAD TRANSFER STATION IMPROVEMENTS



SOLID WASTE AUTHORITY OF CENTRAL OHIO
COLUMBUS, OHIO
CONSTRUCTION DOCUMENTS

March 3, 2025
Volume 2 of 2

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SECTION 21 05 00

BASIC FIRE PROTECTION REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Basic Fire Protection Requirements specifically applicable to Division 21 Sections.

B. Scope of work:

1. All areas as indicated on the drawings are to be protected by an automatic suppression system, of type as indicated.

C. Contractor shall be responsible for designing the distribution systems and sizing of the systems by hydraulically calculation; and shall provide the necessary engineering drawings and calculations to obtain acceptance of all authorities having jurisdiction.

1.2 ADDITIONAL REQUIREMENTS

A. The General Conditions, the Supplementary General Conditions and Division 1 shall govern work under Division 21, in addition to these Basic Fire Protection Requirements.

B. Fire Protection Contractor shall be licensed by the State of Ohio to furnish and install fire protection systems.

C. Contractor shall obtain all necessary permits and licenses pertaining to this Division (expense borne by the Contractor) and comply with Municipal and State Codes, Laws, Ordinances and Regulations, and the requirements of the National Fire Protection Association, and pay all fees and sales taxes as required, and post all bonds incident thereto.

D. The existing sprinkler system at the existing tipping floor shall be re-certified after the water supply and dry valve systems are relocated for temporary operation.

1.3 DEFINITIONS

A. "Piping" includes all pipe, fittings, valves, hangers, and other supports and accessories related to such piping.

B. "Concealed" means hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction, in crawl spaces or buried.

C. "Exposed" means not installed underground or "concealed" as defined above.

D. "Fire Protection Work" is all of the work in Division 21.

E. "Contractor" means the Contractor or Subcontractor performing the required work of their respective Divisions.

F. "Or equivalent" means to possess the same performance qualities and characteristics and

fulfill the utilitarian function without any decrease in quality, durability or longevity.

G. "Provide" means the Contractor shall "furnish and install" work and/or equipment.

H. "FPC" means the Fire Protection Contractor.

1.4 SUBMITTALS

A. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.

B. Mark dimensions and values in units to match those specified.

C. Engineer's review of Shop Drawings shall not relieve Contractor from the responsibility for any variation from the Contract Documents unless the Contractor has in writing called the Engineer's attention to each such variation at the time of submission and the Engineer has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawing review notes; nor shall any review by the Engineer relieve the Contractor from responsibility for having complied with the provisions of the contract, or from responsibility for errors or omissions in the shop drawings.

D. Physical dimension of shop drawings submitted for review shall not exceed 8-1/2" x 11" unless impossible to illustrate data properly without using a larger sheet.

E. Submit shop drawings of the following review:

1. All valves.
2. Alarm and supervisory devices.
3. Sprinkler heads.
4. Air compressor.
5. Dry System components and controls.
6. Pipe and fittings.
7. Siamese connections.
8. Fire Department connections.
9. Double check valve.

F. Drawings indicating new fire protection systems as to be installed with pipe sizes, etc.; and copy of systems hydraulic calculations shall be submitted to the following for review:

1. Authority Having Jurisdiction.

G. Any work installed prior to returned comments of review plans, and is found to require change, shall be changed at this Contractor's expense; including any adjustment to any

systems of other trades already installed.

1.5 SUBSTITUTIONS

A. Contractor shall provide all supporting data and assume the "burden of proof" that any substitute proposed is "equivalent" as to appearance, construction, capacity and performance. The judgment of equivalency shall be made by the Engineer at the time of shop drawing review, not during bidding.

B. Where substitute equipment is accepted and use of such equipment shall require any redesign of structure, foundations, utilities, piping, wiring or of any other part of the architectural, structural, mechanical, sanitary or electrical work, the cost of all such redesign, drawings, detailing and accompanying additional costs of any item of the work shall be paid for by the Contractor. Redesign shall be subject to the approval of all authorities having jurisdiction over the work including the Architect/ Engineer.

C. Contractor shall provide ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit and any other additional materials and equipment required by the system due to accepting equipment substitutions at no additional cost to the Owner.

1.6 GUARANTEES AND WARRANTIES

A. Contractor shall guarantee, in writing, that all work installed shall be free from any and all defects in workmanship and materials; that all apparatus shall develop capacities and characteristics specified; and that if, during the period of one year, or as otherwise specified, from the date of substantial completion, any defects in workmanship, material or performance appear, the Contractor shall, without cost to the Owner, remedy such defects within a reasonable time as specified in notice from the Owner's Representative. In default thereof, the Owner's Representative shall have the work done and charge the cost of the work to the Contractor.

B. Furnish manufacturers written warranties for all equipment, stating effective date of Warranty, to the Owner's Representative.

1.7 MATERIALS

A. All materials shall be new, of best quality and grade, UL approved and in strict accordance with the specification requirements.

B. All systems components shall be rated for the maximum working pressure to which they are exposed, but not less than 175 psi.

C. Similar component items shall be by the same manufacturer, such as:

1. Hangers and supports.
2. Control and isolation valves.
3. Drain valves.

4. Sprinkler heads.
5. Alarm and tamper switches.
6. Detection devices.
7. Systems control panels.

1.8 STORAGE OF EQUIPMENT AND MATERIALS

- A. Materials shall be so stored as to insure preservation of their quality and fitness for the project.
- B. When considered necessary, the equipment and materials shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground, and they shall be placed under cover.
- C. Stored materials shall be located so as to facilitate prompt inspection.
- D. Equipment and materials shall be stored in approved locations and in such a manner as to prevent overloading of the building structure.

1.9 PIPE PROTECTION

- A. Open ends of all pipe, must be effectively closed and kept closed during construction.

1.10 RUBBISH REMOVAL

- A. See "Division 1".
- B. As directed by Owner's representative, during progress of work at completion, remove rubbish, protection, dirt, debris, tools, equipment and unused materials from building and site and leave building premises in a clean, orderly condition.

1.11 COOPERATION WITH OTHER TRADES

- A. Contractor shall give full cooperation to other trades and furnish any information necessary to permit the work of all trades to be installed satisfactory and with least possible interference or delay.
- B. Where the work of the Contractor shall be installed in close proximity to the work of other trades, or where there is evidence that the work of the Contractor shall interfere with work of other trades, the Contractor shall assist in working out space conditions to make a satisfactory adjustment.
- C. If the Contractor installs work before coordinating it with other trades, or so as to cause interference with work of other trades, this Contractor shall make necessary changes in the work to correct the condition without extra charges.

1.12 PROTECTION OF FINISHED WORK

- A. Contractor shall continuously maintain adequate protection of all his work and materials,

whether worked or in worked, on or off site of the project, and shall protect the work and material of all the other Contractors and the existing property from injury arising in connection with their contracts.

B. All damages of each and every kind resulting from neglect or refusal of the Contractor to protect the work and materials and property during erection, construction and completion of the project shall be made good by him.

C. Whenever damage or destruction of property of any character resulting from neglect, misconduct, or omission due to the manner of the method of execution or non-execution of the work or caused by defective work or the use of improper materials, the Contractor shall be held responsible until the work has been corrected, completed and complied with.

1.13 REPAIRS

A. See "Division 1".

B. This contractor shall make good and pay for glass breakage, plaster patching and repairs to all finished work, existing or new caused by this Contractor's work.

1.14 CUTTING AND PATCHING

A. This Contractor shall be responsible for establishing sizes and locations of all openings and lintels in new work and to transmit this information to the Contractor whose work is involved at such time as to avoid cutting and patching.

B. All patching shall match adjacent surfaces.

C. Contractor shall inspect and take note of existing conditions along with the Owner's Representative so as to avoid later disputes with regard to the condition of the existing surface before work began.

D. Openings through existing concrete shall be core-drilled or saw cut.

1.15 OPENING AND SLEEVES

A. Provide openings as necessary to permit installation of piping or any other part of work under this Division.

B. Provide sleeves for all piping penetrating floor and masonry walls.

1.16 JURISDICTION OF WORK

A. The event of jurisdiction (as to whether the work is to be installed by another trade or subcontractor) shall not release the work from this Contract. In such occurrence, the original contractor shall sublet the work to the trade or subcontractor having jurisdiction.

B. The trade or subcontractor having jurisdiction shall perform the work in conformance with these drawings and specifications.

1.17 OPERATING INSTRUCTIONS

- A. Contractor shall, upon completion of all work and of all tests, furnish the necessary skilled, qualified personnel for operating the system for a total of one day of eight (8) hours during times agreed to by the Owner's representative.
- B. During this period, instruct the Owner's representatives fully in the operation, adjustment and maintenance of all equipment furnished.
- C. Give at least forty-eight (48) hours notice to the Owner's representative in advance of this period.
- D. Contractor shall maintain a record of operating instruction periods, documenting the date, time involved, people in attendance and have the Owner's representative attest in writing for each session held; only documented and signed records shall be used to show compliance to the specified instruction periods.

1.18 ELECTRICAL WORK

- A. This Contractor shall furnish and install all alarm and tamper switches, flow indicator switches, pre-action system control panel and detectors and the interfacing wiring between them. All devices shall be 110 VAC; if voltage requirement is lower than 110 VAC for any of this equipment, this Contractor shall be responsible for providing the necessary transformers.
- B. Electrical Contractor is responsible to wire from the fire suppression systems components to the building system and installing and wiring of any transformers required.

1.19 AVAILABLE WATER FLOW DATA

- A. Fire flow tests have been taken, with results as follows:
 - 1. Size of water main in street: 48 inch.
 - 2. Static pressure: 95 PSI
 - 3. Residual pressure: 84 PSI
 - 4. GPM flowing: 5,000
- B. Water test data is preliminary for bidding purposes. Contractor is responsible to verify and obtain any additional test data required for design. Tests to be representative of high water use periods.

1.20 FIRE PROTECTION DOCUMENTATION AVAILABILITY

- A. Contractor, at his option, may obtain from Engineer, compact discs which contain the CAD generated fire protection drawings. The Architectural background drawings must be obtained from the Architect.
- B. The cost to obtain this reproducible documentation will be \$ 250.00 per disc, which includes handling and shipping.

1.21 EXCAVATION AND BACKFILLING

A. Contractor shall be responsible for all excavating and backfilling as required for the work in ground of this Division.

B. Refer to Section 21 05 10 of this Division.

1.22 EXISTING WORK

A. Remove all fire protection related piping, sprinklers, equipment and related piping as indicated by the drawings and specifications to be demolished.

B. All materials, fixtures and equipment removed, except that specifically specified or shown on the drawings to be salvaged, shall become the property of the Contractor and shall be hauled from the job site.

C. Remove, salvage, and deliver to the project salvage site, the following equipment. The project salvage site shall be an area at the job site and determined by the Architect.

1.23 TESTS AND INSPECTIONS

A. Contractor shall be responsible for testing and certification of systems and ordering inspections as required by authorities having jurisdiction.

B. All tests shall be conducted in the presence of and to the satisfaction of the Owner or an authorized representative.

C. Inspections shall be made by the Owner's authorized representative and inspectors having jurisdiction.

1.24 CLEANING

A. After all tests have been made and the systems pronounced to be satisfactory, the Contractor shall go over all work and clean equipment, fixtures, and related appurtenances and piping, and leave them clean and in complete working order at final completion of the project.

1.25 COORDINATION DRAWINGS

A. See Division 1.

1.26 RECORD DRAWINGS

A. Refer to Division 1.

1.27 MAINTENANCE MANUAL

A. Refer to Division 1.

1.28 SITE VISIT

A. Contractor shall visit job site and become familiar with existing conditions prior to starting

work.

PART 2 PRODUCTS

2.1 ACCESS PANELS

A. Manufacturers:

1. Milcor.

2. Knapp.

3. Zurn.

B. Panels shall be of adequate size to permit adjustment or service of concealed devices.

C. Panel design shall be suitable for installation in the material forming the finished surface.

D. Panels in masonry or plaster surfaces shall have a flush metal frame and flush, hinged steel door with flush latch. Latches shall be key operated cylinder lock.

E. Panels in acoustic ceiling shall be recessed type, to which tile can be attached flush with the ceiling tile.

F. Panels shall be UL listed to conform to the fire rating of the surface it is installed in.

2.2 FIRESTOP MATERIALS

A. Comply with specification section 07 84 00 firestopping.

B. One-part, intumescent elastomer, non-corrosive to metal, and compatible with synthetic cable jackets.

C. Material shall expand up to 10 times when exposed to flame or heat.

D. UL classified.

E. Maximum flame spread and fuel contributed of and smoke development of 50 when testing in accordance with ASTM E84.

2.3 BEDDING AND BACKFILL MATERIALS

A. Refer to Sections 21 05 11 and 21 05 12 of this Division.

PART 3 EXECUTION

3.1 ACCESS PANELS

A. Provide access panels for access to equipment, valves, or other specialties installed behind wall or above ceiling surfaces.

B. Lay-in acoustical tee bar ceilings and snap-in removable metal pan ceilings shall be

considered adequate for access.

C. Mechanical Contractor shall sublet installation work to subcontractors specifically skilled in the construction of the surfaces involved.

D. Contractor shall confer with the other Project Contractors with respect to access panel locations and shall, wherever practicable, group devices in such a manner so as to eliminate as many panels as possible.

E. Contractor shall remove all markings and labels from access panels.

3.2 FIRESTOP MATERIALS

A. Comply with specification section 07 84 00 Firestopping.

B. Penetrations through fire and/or smoke rated construction shall be sealed to maintain the rating of the construction in which they occur.

C. Comply with the manufacturer's requirements for proper installation of firestop materials to obtain the required fire and/or smoke rating.

3.3 EXCAVATION AND BACKFILLING

A. Refer to Section 21 05 10, 21 05 11 and 21 05 12 of this Division.

3.4 OPENINGS AND SLEEVES

A. Provide all openings and set all sleeves in cooperation with Contractors whose work is affected thereby.

B. Caulk opening between pipe and sleeve with 3M FireDam Fire Barrier Sealant, or approved equivalent.

C. In event holes must be provided through reinforced concrete, they must be carefully drilled so as to avoid spalling and unnecessary damage of weakening of any structural member; chopping or breaking out will not be permitted.

D. Obtain Architect's approval before providing openings through concrete or masonry in place and then proceed as directed.

E. Contractor shall be responsible for damage to finished work resulting from cutting or drilling required because of neglect of Contractor to provide accurate and sufficient information.

F. Cutting or drilling thru structural beams or joists is not permitted.

3.5 SYSTEM INTERRUPTION

A. Prior to interrupting any system operation, Contractor shall obtain approval for the interruption from the Owner and authority having jurisdiction.

B. The existing sprinkler system in the Tipping Station to be demolished shall remain in

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1 service until the new Transfer Station is operational. Provide temporary relocation of the
2 existing systems to the existing Maintenance Building for re-connection of the existing
3 tipping floor sprinkler system.

4 END OF SECTION

SECTION 21 05 10

EXCAVATING AND BACKFILL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Excavating trenches for utilities.
- B. Compacted fill from top of utility bedding cover to bottom of topsoil or pavement base coarse.
- C. Backfilling and compaction.

1.2 REFERENCES

- A. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.
- B. Specification Division 31 and 33.

1.3 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit or cable.

1.4 FIELD MEASUREMENTS

- A. Verify that survey benchmark, control point, and intended elevations for the work as shown on drawings.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Fill Type: As specified in Sections 21 05 11 and 21 05 12.
- B. Concrete: Lean concrete with a minimum of 1 bag of cement per cubic yard.

PART 3 EXECUTION

3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Maintain, protect and temporarily support above and below grade utilities which are to remain.
- C. Cut out soft areas of subgrade not capable of compaction in place. Backfill with same material as utility bedding and compact to density equal to or greater than requirements for

subsequent backfill material.

3.2 EXCAVATING

- A. Trenching shall include all clearing, grubbing, wet, dry and rock excavation, and all incidental work such as sheet piling, shoring, underpinning, dewatering, pumping, bailing, transportation, filling and backfilling.
- B. Excavate subsoil required for utilities.
- C. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with work.
- D. Do not interfere with 45 degree bearing splay of foundations.
- E. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.
- F. Remove lumped subsoil, boulders, and rock.
- G. Correct areas over excavated.
- H. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.3 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen fill materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Granular Fill Type A3: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.
- D. Soil Fill Type S1: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.
- E. Employ a placement method that does not disturb or damage utilities in trench.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Remove surplus fill materials from site.
- H. Leave fill material stockpile areas completely free of excess fill materials.
- I. Backfill in grassed areas shall be subsoil type S1, with topsoil type S2.
- J. Backfill beneath streets shall be aggregate type A2 with base coarse type A1.
- K. Backfill beneath walks, paved areas and within the building shall be aggregate type A2 with base coarse type A3.

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1 L. All backfill material shall be compacted to achieve 95% compaction.

2 3.4 FIELD QUALITY CONTROL

3 A. Compaction testing will be performed in accordance with ASTM D1557.

4 B. If tests indicate work does not meet specified requirements, remove work, replace,
5 compact, and retest.

6 END OF SECTION

SECTION 21 05 11

AGGREGATE MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aggregate materials.

1.2 REFERENCES

A. Ohio Building Codes and Standards.

B. ASTM D1557 - Test methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb. Rammer and 18 inch Drop.

C. Specification Division 31 and 33.

1.3 SUBMITTALS FOR INFORMATION

A. Materials Source: Submit name of imported materials suppliers.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

PART 2 PRODUCTS

2.1 AGGREGATE MATERIALS

A. Aggregate Type A1: Conform to the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

B. Aggregate Type A2: Crushed stone, crushed stone screenings, or bedding sand. Conform to the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

C. Aggregate Type A3: Granular backfill. Conform to the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

2.2 SOURCE QUALITY CONTROL

A. Provide materials of each type from same source throughout the work.

B. Testing and analysis: Perform in accordance with ASTM D1557.

1 PART 3 EXECUTION

2 3.1 STOCKPILING

- 3 A. Stockpile material on site at locations designated by Architect/Engineer.
- 4 B. Stockpile in sufficient quantities to meet project schedule and requirements.
- 5 C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- 6 D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of
- 7 materials.

8 3.2 STOCKPILE CLEANUP

- 9 A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent
10 free standing surface water.

11 3.3 TESTS

- 12 A. Contractor shall include the cost of 3 compaction tests to be performed by an independent
13 testing laboratory. Locations to be determined by the Architect/Engineer.
- 14 B. If tests indicate materials do not meet specified requirements change materials and retest.

15 END OF SECTION

SECTION 21 05 12

SOIL MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sub33 materials.

B. Topsoil materials.

1.2 REFERENCES

A. Ohio Building Codes and Standards.

B. ASTM D1557 - Test methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb. Rammer and 18 inch Drop.

C. Specification Division 31 and 33.

1.3 SUBMITTALS FOR INFORMATION

A. Materials Source: Submit name of imported materials suppliers.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

PART 2 PRODUCTS

2.1 SUBSOIL MATERIALS

A. Subsoil Type S1:

1. Refer to Specification Division 31 and 33.

2. Excavated and reused material.

3. Graded.

4. Free of lumps larger than 3 inches, rocks larger than 2 inches and debris.

2.2 TOPSOIL MATERIALS

A. Topsoil Type S2:

1. Refer to Specification Division 31 and 33.

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2. Imported borrow.

3. Friable loam.

4. Reasonably free of roots, rocks larger than 2 inch, subsoil, debris, large weeds, and foreign matter.

5. Acidity range (pH) 5.5 to 7.5.

2.3 SOURCE QUALITY CONTROL

A. Provide materials of each type from same source throughout the work.

B. Testing and analysis: Perform in accordance with ASTM D1557.

PART 3 EXECUTION

3.1 SOIL REMOVAL

A. Excavate subsoil and topsoil from areas designated.

B. Remove lumped soil, boulders, and rock.

C. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.2 STOCKPILING

A. Stockpile materials on site at locations designated by Architect.

B. Stockpile in sufficient quantities to meet project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Prevent intermixing of soil types or contamination.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

3.4 SOIL SCHEDULE

A. Comply with Specification Division 31 and 33.

B. Subsoil Type S1: Provide between utility cover material and topsoil in seeded or sodded areas.

C. Topsoil Type S2: Provide at all areas to be seeded or sodded.

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1 3.5 TESTS

- 2 A. Contractor shall include the cost of 3 compaction tests to be performed by an independent
3 testing laboratory. Locations to be determined by the Architect/Engineer.
- 4 B. If tests indicate materials do not meet specified requirements, change materials and retest.

5 END OF SECTION

SECTION 21 05 29

SUPPORTS AND ANCHORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe hangers and supports.
- B. Interior wall and floor pipe penetrations.
- C. Roof Pipe Curbs
- D. Exterior Wall Penetrations

1.2 REFERENCES

- A. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- B. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- C. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- D. NFPA 13 - Installation of Sprinkler Systems.
- E. NFPA 14 - Standpipe and Hose Systems.
- F. UL - Fire Resistance Directory.

1.3 SUBMITTALS

- A. Product Data: Schedule of all hanger and support devices indicating shields, attachment methods and type of device for each pipe size and type of service.
- B. Manufacturer's catalog data for all pre-fabricated pipe penetrations.
- C. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.4 QUALITY ASSURANCE

- A. Conform to applicable code for support of piping.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Manufacturers:
 - 1. Grinnell.

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- 1
2. B-Line.
- 2
3. Michigan Hanger.
- 3
4. Uni Strut.
- 4
5. Fee & Mason.
- 5
- B. Conform to ASME B31.9 MSS SP-58 and MSS SP-69.
- 6
- C. Hangers:
- 7
1. For pipe sizes 4 inches and under: Carbon steel, adjustable swivel ring, or
- 8 adjustable clevis. MSS SP-69 Type 10 or Type 1.
- 9
2. For pipe sizes 5 inches and over: Carbon steel, adjustable clevis, MSS SP-69 Type
- 10 1.
- 11
- D. Multiple or Trapeze Hangers:
- 12
1. Steel channels with welded spacers and hanger rods.
- 13
- E. Wall Support:
- 14
1. Pipe sizes 2 inches and under: Carbon steel hook.
- 15
2. Pipe sizes 2-1/2 inches and over: Welded steel bracket and MSS SP-69 Type 32 or
- 16 33 and steel clamp.
- 17
- F. Vertical Support: Steel riser clamp, MSS SP-69 Type 8.
- 18
- G. Accessories:
- 19
1. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous
- 20 threaded, black finish with adjusting locknuts.
- 21
2. Beam Clamps:
- 22
- a. MSS SP-69 Type 23 malleable black iron clamp for attachment to beam
- 23 flange for use with pipe sizes 4 inches and less. Furnish with a hardened
- 24 steel cup point set screw.
- 25
- b. MSS SP-69 Type 28 or Type 29 forged steel jaw type clamp with a tie rod
- 26 to lock clamp in place, suitable for rod sizes to 1-1/2 inch diameter but
- 27 limited in application to pipe sizes 8 inches and less without prior
- 28 approval.
- 29
3. Concrete Inserts:
- 30
- a. MSS SP-69 Type 18 wedge type or universal concrete inserts for pipes 8"
- 31 and under.
- 32
- b. Wedge type: Black carbon steel body with a removable malleable iron nut
- 33 that accepts threaded rod to 7/8 inch diameter. Wedge design to allow the

- 1 insert to be held by concrete in compression to maximize the load carrying
- 2 capacity.
- 3 c. Universal type: Black malleable iron body with a removable malleable
- 4 iron nut that accepts threaded rod to 7/8 inch diameter.
- 5 d. Use drilled steel shell with plug type inserts when the inserts are placed
- 6 after the concrete is poured.
- 7 4. Continuous Concrete Insert Channels:
- 8 a. Steel inserts with an industry standard pre-galvanized finish, nominally 1-
- 9 5/8 inch wide by 1-3/8 inch deep by length to suit the application, designed
- 10 to be nailed to concrete forms and provide a linear slot for attaching other
- 11 support devices.
- 12 b. Load rating of 2000 pounds per foot in concrete.
- 13 c. Manufacturer's standard brackets, inserts, and accessories designed for the
- 14 channel inserts may be used.
- 15 d. Select insert length to accommodate all pipe, duct, and conduit in the area.
- 16 H. Powder actuated anchors are not acceptable.
- 17 2.2 INTERIOR WALL AND FLOOR PIPE SLEEVES
- 18 A. Material: 18 gauge galvanized steel or steel pipe.
- 19 B. Diameter: One inch larger than outside diameter of the pipe, conduit or pipe insulation.
- 20 C. Length: Sufficient length to pass thru wall or floor. Sleeves in Mechanical Room floors
- 21 shall extend 6" above finished floor.
- 22 2.3 ROOF PIPE CURBS
- 23 A. Manufacturers:
- 24 1. Custom curb.
- 25 2. Pate.
- 26 3. Roof Product and Systems.
- 27 4. ThyCurb.
- 28 5. Vent Products.
- 29 B. Curb Construction:
- 30 1. Continuously welded, 18 gauge, galvanized steel shell.
- 31 2. Integral base plate.
- 32 3. 3 lb. density, 1-1/2" thick rigid insulation.
- 33 4. 2" x 2" treated wood nailer.

- 5. Compensate for roof pitch for level installation.
- C. Minimum height above deck, 12".
- D. Cover: Acrylic clad thermoplastic cover, galvanized fastening screws, graduated step boots with stainless steel clamps.

2.4 PIPE PENETRATIONS THROUGH EXTERIOR WALLS AND FLOORS

A. Manufacturers:

- 1. Thunderline Link-Seal.

B. Modular, mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and wall opening, elastomeric element sized and selected per manufacturers recommendations and have the following properties as designated by ASTM:

- 1. -40° F. to 250° F.: EPDM, ASTM D2000 M3 BA510.
- 2. -67° F. to 400° F.: Silicone, ASTM D2000 M1 GE505.

C. Sleeves:

- 1. New concrete walls and floors: Pre-formed HPDR thermoplastic, integral waterstop and reinforcing ribs, nailer end caps.
- 2. Existing concrete walls and floors: Core-drilled opening.
- 3. Masonry walls: Schedule 40 steel pipe grouted in place.

2.5 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.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

3.2 INSERTS

- A. Provide inserts for placement in concrete formwork.
- B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.

C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.

D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

3.3 PIPE HANGERS AND SUPPORTS

A. Pipe hangers shall be spaced in accordance with the manufacturer's recommendations and in compliance with NFPA applicable regulations.

B. Install hangers to provide minimum 2 inch space between finished covering and adjacent work.

C. Place hangers within 12 inches of each horizontal elbow.

D. Use hangers with 1-1/2 inch minimum vertical adjustment.

E. Support vertical piping at every floor.

F. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

G. Support riser piping independently of connected horizontal piping.

H. Design hangers for pipe movement without disengagement of supported pipe.

I. Adjust hangers to obtain the slope specified in the appropriate piping section.

J. Where piping and equipment hangers occur in areas designated to receive spray-on-fireproofing:

1. Secure all hangers, support members, beam clamps, etc. which is required to support piping and equipment from the framing system designated to receive spray-on fireproofing, before the spray-on material is applied.

2. After the spray-on material is applied, complete the installation of the suspension components, and then install the pipe and equipment.

3. This Contractor shall be responsible to determine the areas specified to receive spray-on fireproofing and schedule his work accordingly.

4. This Contractor shall not be allowed to remove any sprayed-on fireproofing material in order to attach his hangers and supports.

K. Areas where corrosive atmosphere coatings are required are as follows:

1. Exterior locations.

2. Tipping floor.

3.4 ROOF PIPE CURBS

- A. Turn curbs over to the appropriate Contractor for installation (turnover point shall be on the roof at point of installation).
- B. Contractor shall install (set and secure) curbs.

3.5 INTERIOR WALL PENETRATIONS

A. Piping:

- 1. Thru walls where drywall or masonry does not extend to structure: No special requirements.
- 2. Thru walls where drywall, concrete, or masonry extends to structure and thru floors:
 - a. For new masonry and concrete walls and floors, furnish sleeves to the appropriate Contractor for installation. Provide sleeve layout.
 - b. For new fire-rated drywall walls, furnish and install sleeves.
 - c. For non-rated drywall walls, no sleeve is required.
 - d. For existing masonry walls, provide sleeve and grout sleeve in wall.
 - e. Fill void between pipe and wall, floor or sleeve with mineral wool.
 - f. Non-rated walls and floors: Caulk both sides with non-hardening caulk.
 - g. Rated walls and floors: Seal both sides with UL rated firestop system.
- 3. Thru pre-cast deck:
 - a. Core-drill hole thru topping and pre-cast deck. No sleeve is required.
 - b. Fill void between pipe or insulation and floor with mineral wool.
 - c. Seal both sides with UL rated firestop system.
- 4. Thru pre-cast deck with waterproof membrane:
 - a. Core-drill hole thru pre-cast deck. Furnish and install sleeve to attach top of pre-cast deck. Sleeve shall extend minimum 2" above top of topping and shall be used for attaching membrane and as concrete stop.
 - b. Fill void in pre-cast plank for holes 4" and larger before installing pipe.
 - c. Fill void between pipe or insulation and floor with mineral wool.
 - d. Seal both sides with UL rated firestop system.

- B. Install chrome plated steel escutcheons at penetrations exposed in finished rooms.

END OF SECTION

SECTION 21 05 53

IDENTIFICATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.

1.2 REFERENCES

- A. ASME A13.1 - Scheme for the Identification of Piping Systems.
- B. NFPA

1.3 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Product Data: Provide manufacturers catalog literature for each product required.

1.4 CONTRACT CLOSEOUT SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Submit valve chart and schedule, including valve tag number, actual location, function, size and valve manufacturer's name and model number.
- C. For additions and remodeling projects; the new valve numbers shall be a continuation of the existing numbering system; as directed by the Owner.

PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Manufacturers:
 - 1. W.H. Brady.
 - 2. Seton Name Plate Company.
- B. Description: 3/4" high, 1/16" thick plastic with engraved white letters on dark contrasting

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background color, beveled edges, screw mounting. Provide adhesive mounting where it is not feasible to attach plate with screws.

2.2 TAGS

A. Manufacturers:

1. W.H. Brady.
2. Seton Name Plate Company.

B. Plastic Tags: 1/16" thick laminate plastic with engraved letters on contrasting background color. Color to match color used for pipe markers. Tag size minimum 1-1/2 inch diameter.

C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

D. Chart: Typewritten letter size list in anodized aluminum frame.

2.3 HYDRAULIC DESIGN INFORMATION SIGN

A. Manufacturers:

1. Grinnell, Viking, Reliable.

B. Description:

1. Permanently marked weatherproof metal or rigid plastic sign lithographed with white letters on red background and red letters in white spaces.
2. Sign shall include the following:
 - a. Location of the design area or areas.
 - b. Discharge densities over the design area or areas.
 - c. Required flow and residual pressure demand at the base of riser.
 - d. Occupancy classification or commodity classification and maximum permitted storage height and configuration.
 - e. Hose stream demand included in addition to the sprinkler demand.

2.4 STENCILS

A. Stencils: With clean cut symbols and letters of following size:

1. 3/4 to 1-1/4 inch Outside Diameter of Pipe: 8 inch long color field, 1/2 inch high letters.
2. 1-1/2 to 2 inch Outside Diameter of Pipe: 8 inch long color field, 3/4 inch high letters.
3. 2-1/2 to 6 inch Outside Diameter of Pipe: 12 inch long color field, 1-1/4 inch high letters.

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4. 8 to 10 inch Outside Diameter of Pipe: 24 inch long color field, 2-1/2 inch high letters.

5. Over 10 inch Outside Diameter of Pipe: 32 inch long color field, 3-1/2 inch high letters.

6. Equipment: 2-1/2 inch high letters.

B. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

2.5 PIPE MARKERS

A. Manufacturers:

1. W.H. Brady.

2. Seton Nameplate Company.

B. Color: Conform to ASME A13.1.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings; secure with 2" wide tape with arrows indicating flow.

D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with specification section for painting.

3.2 INSTALLATION

A. Nameplates:

1. Install with corrosive-resistant mechanical fasteners or adhesive.

a. Control panels.

b. Pumps.

B. Tags:

1. Install with brass chain and "S" hooks around valves and drain valves.

C. Hydraulic design information sign:

1. Install with brass chain and "S" hooks around each valve supplying the corresponding hydraulically designed area.

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D. Stencil:

1. Apply in accordance with painting specification section.
2. Locations:
 - a. Piping, mains and risers:
 - 1). Exposed.
 - 2). Concealed in accessible spaces.

E. Pipe markers:

1. Install in accordance with manufacturer's instructions.
2. Locations:
 - a. Piping, mains and risers.
 - 1). Exposed.
 - 2). Concealed in accessible spaces.
3. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried service pipe, outside of the building footprint.

F. Pipe identification:

1. Identify service and flow direction on all new piping of this division.
2. Install identification in clear view and align with axis of piping. Locate identification not-to-exceed 20 feet on straight runs including risers, adjacent to each valve, at each side of penetration of structure or, enclosure, at each obstruction and within 5 feet of access panel.
3. Identification wording: Fire Protection Water Drain

END OF SECTION

SECTION 21 10 00

PIPING FITTINGS AND SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe, fittings, valves, tamper switch, flow indicator device and connections for sprinkler systems.

1.2 REFERENCES

- A. ASTM A53 - Pipe, steel, black and hot-dipped, zinc coated welded and seamless.
- B. ASTM A395 - Ferritic Ductile Iron Pressure-Retaining Castings.
- C. ASTM A536 - Ductile Iron Castings
- D. ASTM A795 - Pipe, steel, black and hot-dipped, zinc coated, welded and seamless for fire protection use.
- E. NFPA 13 - Installation of sprinkler systems.

1.3 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Product Data: Provide data on pipe materials, pipe fittings and valves. Provide manufacturers catalog information. Indicate valve data and ratings.

PART 2 PRODUCTS

2.1 PIPE AND FITTINGS ABOVE GROUND

- A. Pipe 2" and smaller: Steel, black, Schedule 40, ASTM A53, ASTM A795 or ASTM A135.
- B. Fittings 2" and smaller:
 - 1. Cast iron, threaded, ASTM B16.3 or malleable iron, threaded, ASTM A47.
- C. Pipe 2-1/2" and larger: Steel, black, Schedule 10, ASTM A53, ASTM A135.
- D. Fittings 2-1/2" and larger: Mechanical grooved couplings, ductile iron housing clamps to engage and lock "C" shaped pressure responsive elastomeric sealing gasket, steel bolts, nuts and washers. Housings shall be cast with offsetting, angle-pattern bolt pads to provide system rigidity and support and hanging in accordance with NFPA 13. Victaulic Style 005. Fittings shall be ductile iron, conforming to ASTM A395 and A536, with grooves designed to accept grooved end couplings of the same manufacturer.
- E. Pipe and fittings for dry pipe system shall be galvanized in accordance with ASTM A153.

2.2 PIPE AND FITTINGS BELOW GROUND

- A. Pipe 4" and Larger: AWWA C151 Ductile iron pipe with AWWA C104 cement lining, AWWA C110 Ductile iron fittings with restrained mechanical joints, AWWA C105 polyethylene encasement.

2.3 SPECIALTIES

A. Zone Control Valves:

1. Manufacturers:

- a. Up to and including 2": Nibco KT 505W-8 or KG 505W-8.
b. Over 2": Nibco GD-4765-BN.

2. Other acceptable manufacturers offering equivalent products:

- a. Kennedy.
b. Milwaukee.

3. Type, up to and including 2": Full port design, threaded or grooved, bronze ball valve with factory installed supervisory/tamper switch and valve position indicator, FM approved and U.L. listed.

4. Type, over 2": Butterfly valve, ductile iron body, grooved ends, handwheel with indicator flag, factory installed supervisory/tamper switch, FM approved, UL listed, 175 psi WWP.

B. Trim and Drain Valves:

1. Manufacturers:

- a. Nibco KT 585-70-UL & KT-580-70 UL.

2. Other acceptable manufacturers offering equivalent products:

- a. Kennedy.
b. Milwaukee.

C. Tamper Switches for Valves over 2":

1. Manufacturers:

- a. System Sensor Model OSY2
b. Potter Model OSYSU-2.

2. Other acceptable manufacturers offering equivalent products:

- a. Notifier.
b. Grinnell.

3. Type: Outside screw and yoke valve supervisory switch with die cast aluminum

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cover, tamper resistant screws and two sets of contacts, 125 VAC, UL listed.

D. Flow Indicator Device:

1. Manufacturer:

- a. System Sensor Model WFD.
- b. Potter Model VSR-F.

2. Other acceptable manufacturers offering equivalent products:

- a. Notifier.
- b. Grinnell.

3. Type: Vane type water flow alarm switch with adjustable retard, two sets of contacts, cast aluminum housing, 125 VAC, UL listed.

E. Backflow Preventor:

1. Manufacturers:

- a. Watts Model 774 DCDA-OSY.

2. Other acceptable manufacturers offering equivalent products:

- a. Ames Co.

3. Type: Double check detector assembly consisting of two independently operating center stem guided check modules with stainless steel body, stainless steel internal parts, four ball type test cocks, UL/FM two resilient seated O.S. & Y. gate valves and hydraulically balanced meter by-pass assembly to detect low flows. Units shall be ASSE approved for vertical installation.

F. Fire Department Connection:

1. Manufacturers:

- a. Potter-Roemer, Model 5761-C.

2. Other acceptable manufacturers offering equivalent products:

- a. Elkhart Brass.
- b. Croker.
- c. Reliable.

3. Type: Flush design cast brass body with drop clappers, size 4" x 2-1/2" x 2-1/2" with outlet location as required; also with brass plate with lettering Auto.Spr., two (2) brass 2-1/2" female snoots with rigid end NPT and pin lug hose thread swivels, pin lug plugs and chains. All exposed surfaces and trim shall be polished chrome plated. Hose threads to match local Fire Department requirements.

4. Where applicable, install a 90 degree elbow with drain connection at each Fire

Department connection. Elbow shall be equal to Victaulic #10-DR.

G. Inspector's Test and Drain Assemblies:

1. Manufacturer:

- a. Victaulic Company of America Style 720 TestMaster™ II.
- b. Viking.

2. Other acceptable manufacturers offering equivalent products:

- a. AGF.
- b. Star.
- c. Central.

3. Type: Brass constructed ball valve with smooth base corrosion resistant orifice giving a flow equivalent to one sprinkler head, U.L. listed and FM Global approved, and with sight glass.

H. Check Valves:

1. Manufacturers:

- a. Victaulic Company of America Series 717.
- b. Nibco F-908-W.

2. Other acceptable manufacturers offering products:

- a. Kennedy.
- b. Milwaukee.

3. 2-1/2" and larger: Cast ductile iron body, flanged or grooved ends, bronze trim, with bolted cap; aluminum bronze or elastomer encapsulated ductile iron disc, stainless steel spring and shaft, 175 psig, suitable for installation in a horizontal or vertical line with flow upward.

4. Provide 1/2" automatic drip drain on inlet of fire department connection check valve.

I. Alarm Bells:

1. Manufacturers:

- a. System Sensor Model SSV120-10.
- b. Potter Model PBA-AC or equivalent.

2. Type: 10" alarm bell with weatherproof backbox for exterior use, 120V AC, UL and FM Global approved.

PART 3 EXECUTION

3.1 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.

3.2 INSTALLATION

- A. Install pipe and fittings in accordance with reference standards, manufacturer's recommendations and recognized industry practices.
- B. 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.
- C. Where interferences develop in the field, offset or reroute piping as required to clear such interferences. Coordinate locations of fire protection piping with piping, ductwork, conduit and equipment of other trades to allow sufficient clearances. In all cases, consult drawings for exact location of pipe spaces, ceiling heights, ceiling grid layout, light fixtures and grilles before installing piping.
- D. Where copper or steel piping is embedded in masonry or concrete, provide protective sleeve covering.
- E. Maintain piping in clean condition internally during construction.
- F. Provide clearance for access to valves and piping specialties.
- G. Install piping so that system can be drained. Where possible, slope to main drain valve. Slope dry pipe or preaction systems subject to freezing at minimum 1/4"/10' on mains and 1/2"/10' on branches. Where piping is not susceptible to freezing and cannot be fully drained, install nipple and cap for drainage of less than 5 gallons or valve/nipple/cap for drainage over 5 gallons. Pipe drain valves to grade or to air gap sewer receptor.
- H. Mitered ells, notches tees, and orange peel reducers are not acceptable. On threaded piping, bushings are not acceptable.
- I. Do not route piping within exterior walls.
- J. Do not route piping through transformer vaults or above transformers, panelboards, or switchboards, including the required service space for this equipment, unless the piping is serving this equipment.
- K. 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.
- L. Grooved End Installation: All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components. Grooved ends shall be clean and free from indentations,

projections, and roll marks in the area from pipe end to groove.

3.3 PIPING SYSTEM LEAK TESTS

- A. Conduct pressure test with test medium of water. If leaks are found, repair the area with new materials and repeat the test; caulking will not be acceptable.
- B. Test piping in sections or entire system as required by sequence of construction. Do not conceal pipe until it has been successfully tested. If required for the additional pressure load under test, provide temporary restraints at fittings or expansion joints. Entire test must be witnessed by the Owner's representative.
- C. Use clean water and remove air from the piping being tested where possible. Measure and record test pressure at the high point in the system.
- D. Test system at 175 psi for 2 hours showing no leakage.
- E. All pressure tests are to be documented on NFPA Contractor's Material and Test Certificate forms.

END OF SECTION

SECTION 21 13 00

AUTOMATIC SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Automatic sprinkler systems:

1. Wet-pipe.

2. Dry-pipe.

3. Anti-freeze.

B. System design, installation, and certification.

1.2 REFERENCES

A. NFPA 13 - Installation of sprinkler systems.

B. NFPA 30 - Flammable and Combustible Liquid Code

C. NFPA 72 - Installation, maintenance and use of protective signaling devices.

D. Applicable provisions of Division 1 and 26.

1.3 SYSTEM DESCRIPTION

A. Provide automatic sprinkler system to protect building area, as indicated.

B. System components to be UL listed and labeled and FM Global approved; and to be rated for minimum operating pressure of 175 psig.

1.4 DESIGN

A. Light hazard areas shall be hydraulically designed to provide 0.10 gpm/sq.ft. over the hydraulically most remote 1500 s.f. with a maximum head spacing of 225 sq.ft./hd.

B. Ordinary Hazard/Group 1 shall be hydraulically designed to provide 0.15 gpm/sq.ft. over the hydraulically most remote 1500 s.f. with a maximum head spacing of 130 sq. ft. per sprinkler.

C. Refer to schedule on drawings for specific area requirements.

D. For areas protected by the preaction and dry pipe systems, increase the most remote sq.ft. area by 30%.

E. Systems design shall conform to systems schedule on the drawings, plus compliance to NFPA and requirements of local authorities having jurisdiction.

F. Design of the hydraulically calculated sprinkler systems shall include a demand for inside and outside hose streams.

G. Sprinklers shall be referred to on drawings, submittals and other documentation, by the sprinkler identification or model number as specifically published in the appropriate agency listing or approval. Trade names or other abbreviated designations shall not be allowed.

PART 2 PRODUCTS

2.1 SPRINKLER HEADS

A. Manufacturers:

1. Viking.

B. Other manufacturers offering equivalent products:

1. Central.

2. Star.

3. Victaulic Company of America.

C. Type:

1. Sprinkler heads shall be of the glass-bulb type as scheduled on the drawings. Body shall be die cast brass, with hex-shaped wrench boss cast into the body to facilitate installation and reduce the risk of damage during installation.

2. Escutcheons and guards should be listed, supplied and approved for use with the sprinkler by the sprinkler manufacturer.

2.2 DRY-PIPE SPRINKLER SYSTEM

A. Provide a complete dry-pipe automatic sprinkler system including, but not limited to, valves, trim, piping, sprinkler heads, pressure switches, alarm devices and all incidental items required for a complete and operational system.

B. The Contractor shall provide and install the following:

1. Victaulic Series 756 or Star Model A dry-pipe valve.

2. Air maintenance device.

3. Sprinkler heads, glass-bulb type as indicated.

4. Speedaire compressor with ASME tank, size as required.

5. Zone control valve with tamper switch.

6. System Sensor Model WFD or Potter Electric PS10-2 water-flow pressure switch.

7. System Sensor Model EPS10 or EPS40 or Potter Electric PS40-2 air supervisory pressure switch.

8. Releasing Panel

C. The contractor shall provide all interconnecting wiring between devices in compliance with electrical codes and Division 26. The electrical contractor will provide electrical power to the air compressor and dry system panel.

2.3 ANTI-FREEZE SYSTEM

A. Provide an anti-freeze automatic sprinkler system including all valves, trim, piping, sprinkler heads, backflow prevention device as per NFPA 13, and all incidental items required for a complete and operational system.

PART 3 EXECUTION

3.1 INSTALLATION

A. Locate sprinkler heads, main piping and valves as indicated on the drawings.

B. Install sprinkler heads to coordinate with all lights, grilles and any other obstructions in ceiling.

C. Center sprinkler heads in ceiling tile and provide piping offsets as required.

D. Where ceiling is to be painted or sprayed, apply paper cover over sprinkler heads to ensure the head and escutcheons do not get coated. Remove protective paper cover after painting or spraying is completed.

E. Provide mountable metal box of spare heads with proper wrench for head replacement.

F. Locate sprinkler heads and piping parallel to structural members in the skylight area.

G. Do not install sprinklers that have been dropped, damaged, or show a visible loss of fluid. Never install sprinklers with cracked bulbs.

H. All grooved end valves and specialties shall be of the same manufacturer as the grooved fittings and couplings.

END OF SECTION

SECTION 22 05 00

BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Basic Plumbing Requirements specifically applicable to Division 22 Sections.

1.2 ADDITIONAL REQUIREMENTS

- A. The General Conditions, the Supplementary General Conditions and Division 1 shall govern work under Division 22, in addition to these Basic Plumbing Requirements.

1.3 DEFINITIONS

- A. "Piping" includes all pipe, fittings, valves, hangers, and other supports and accessories related to such piping.
- B. "Concealed" means hidden from sight in chases, furred spaces, shafts, hung ceilings, embedded in construction, in crawl spaces or buried.
- C. "Exposed" means not installed underground or "concealed" as defined above.
- D. "Plumbing Work" is all of the work in Division 22.
- E. "Contractor" means the Contractor or Subcontractor performing the required work of their respective Divisions.
- F. "Or equivalent" means to possess the same performance qualities and characteristics and fulfill the utilitarian function without any decrease in quality, durability or longevity.
- G. "Provide" means the Contractor shall "furnish and install" work and/or equipment.

1.4 SUBMITTALS

- A. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- B. Mark dimensions and values in units to match those specified.
- C. Engineer's review of Shop Drawings shall not relieve Contractor from the responsibility for any variation from the Contract Documents unless the Contractor has in writing called the Engineer's attention to each such variation at the time of submission and the Engineer has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the Shop Drawing review notes; nor shall any review by the Engineer relieve the Contractor from responsibility for having complied with the provisions of the contract, or from responsibility for errors or omissions in the shop drawings.

- D. Physical dimension of shop drawings submitted for review shall not exceed 8-1/2" x 11" unless impossible to illustrate data properly without using a larger sheet.

1.5 SUBSTITUTIONS

- A. Contractor shall provide all supporting data and assume the "burden of proof" that any substitute proposed is "equivalent" as to appearance, construction, capacity and performance. The judgment of equivalency shall be made by the Engineer at the time of shop drawing review, not during bidding.
- B. Where substitute equipment is accepted and use of such equipment shall require any redesign of structure, foundations, utilities, piping, wiring or of any other part of the architectural, structural, mechanical, sanitary or electrical work, the cost of all such redesign, drawings, detailing and accompanying additional costs of any item of the work shall be paid for by the Contractor. Redesign shall be subject to the approval of all authorities having jurisdiction over the work including the Architect/ Engineer.
- C. Contractor shall provide ductwork, piping, structural supports, insulation, controllers, motors, starters, electrical wiring and conduit and any other additional materials and equipment required by the system due to accepting equipment substitutions at no additional cost to the owner.

1.6 GUARANTEES AND WARRANTIES

- A. Contractor shall guarantee, in writing, that all work installed shall be free from any and all defects in workmanship and materials; that all apparatus shall develop capacities and characteristics specified; and that if, during the period of one year, or as otherwise specified, from the date of substantial completion, any defects in workmanship, material or performance appear, the Contractor shall, without cost to the Owner, remedy such defects within a reasonable time as specified in notice from the Owner's Representative. In default thereof, the Owner's Representative shall have the work done and charge the cost of the work to the Contractor.
- B. Furnish manufacturers written warranties for all equipment, stating effective date of Warranty, to the Owner's Representative.

1.7 CUTTING AND PATCHING

- A. This Contractor shall be responsible for establishing sizes and locations of all openings and lintels in new work and to transmit this information to the Contractor whose work is involved at such time as to avoid cutting and patching.
- B. All patching shall match adjacent surfaces.
- C. Contractor shall inspect and take note of existing conditions along with the Owner's Representative so as to avoid later disputes with regard to the condition of the existing surface before work began.
- D. Openings through existing concrete shall be core-drilled or saw cut.

1.8 JURISDICTION OF WORK

- A. The event of jurisdiction (as to whether the work is to be installed by another trade or subcontractor) shall not release the work from this Contract. In such occurrence, the original contractor shall sublet the work to the trade or subcontractor having jurisdiction.
- B. The trade or subcontractor having jurisdiction shall perform the work in conformance with these drawings and specifications.

1.9 OPERATING INSTRUCTIONS

- A. Contractor shall, upon completion of all work and of all tests, furnish the necessary skilled, qualified personnel for operating the system for a total of one day of eight (8) hours each during times agreed to by the owner's representative.
- B. During this period, instruct the owner's representative fully in the operation, adjustment and maintenance of all equipment furnished.
- C. Give at least forty-eight (48) hours notice to the owner's representative in advance of this period.
- D. Contractor shall maintain a record of operating instruction periods, documenting the date, time involved, people in attendance and have the owner's representative attest in writing for each session held; only documented and signed records shall be used to show compliance to the specified instruction periods.

1.10 PLUMBING DOCUMENTATION AVAILABILITY

- A. Contractor, at his option, may obtain from Engineer, compact discs which contain the CAD generated plumbing drawings. The Architectural background drawings must be obtained from the Architect.
- B. The cost to obtain this reproducible documentation will be \$ 250.00 per disc, which includes handling and shipping.

1.11 INTERIOR EXCAVATION AND BACKFILLING

- A. Contractor shall do all excavating and backfilling as required for the underground work of this Division.
- B. Refer to specification sections of this Division for excavating and backfilling requirements.

1.12 EXISTING WORK

- A. Remove all plumbing related piping, fixtures and equipment as indicated by the drawings and specifications to be demolished.
- B. All materials, fixtures and equipment removed, except that specifically specified or shown on the drawings to be salvaged, shall become the property of the Contractor and shall be hauled from the job site.
- C. Remove, salvage, and deliver to the project salvage site, items specifically identified to be

turned over to the owner. The project salvage site shall be an area at the job site and determined by the Architect.

1.13 ELECTRICAL WORK

A. Contractor shall provide all electrical work required for low voltage wiring associated with the work of this contract.

B. All electrical work shall comply with the requirements of Division 26.

1.14 SITE VISIT

A. Contractor shall visit job site and become familiar with existing conditions prior to starting work.

PART 2 PRODUCTS

2.1 ACCESS PANELS

A. Manufacturers:

1. Milcor.

2. Knapp.

3. Zurn.

B. Panels shall be of adequate size to permit adjustment or service of concealed devices.

C. Panel design shall be suitable for installation in the material forming the finished surface.

D. Panels in masonry or plaster surfaces shall have a flush metal frame and flush, hinged steel door with flush latch. Latches shall be [key operated cylinder lock] [screwdriver operated].

E. Panels in acoustic ceiling shall be recessed type, to which tile can be attached flush with the ceiling tile.

F. Panels shall be UL listed to conform to the fire rating of the surface it is installed in.

2.2 FIRESTOP MATERIALS

A. Comply with specification section 07 84 00 Firestopping.

B. One-part, intumescent elastomer, non-corrosive to metal, and compatible with synthetic cable jackets.

C. Material shall expand up to 10 times when exposed to flame or heat.

D. UL classified.

E. Maximum flame spread and fuel contributed of 25 and smoke development of 50 when testing in accordance with ASTM E84.

PART 3 EXECUTION

3.1 ACCESS PANELS

- A. Provide access panels for access to equipment, valves, or other specialties installed behind wall or above ceiling surfaces.
- B. Lay-in acoustical tee bar ceilings and snap-in removable metal pan ceilings shall be considered adequate for access.
- C. Contractor shall sublet installation work to subcontractors specifically skilled in the construction of the surfaces involved.
- D. Contractor shall confer with the other Project Contractors with respect to access panel locations and shall, wherever practicable, group devices in such a manner so as to eliminate as many panels as possible.
- E. Contractor shall remove all markings and labels from access panels.

3.2 FIRESTOP MATERIALS

- A. Comply with specification section 07 84 00 Firestopping.
- B. Penetrations through fire and/or smoke rated construction shall be sealed to maintain the rating of the construction in which they occur.
- C. Comply with the manufacturer's requirements for proper installation of firestop materials to obtain the required fire and/or smoke rating.

3.3 NEW, EXISTING AND DEMOLITION WORK

- A. Contractor shall provide all materials and labor required to do the new plumbing work and demolition work as shown.
- B. Certain vertical and horizontal offsets are shown in piping to indicate the general position relationship of the systems; provide additional offsets, as required to coordinate with the installation requirements of other systems. Route piping in interstitial and ceiling spaces in designated spaces.
- C. Install all piping to best suit field conditions and coordinate with the installation work of other trades; the drawings are diagrammatic and shall not be scaled to determine exact locations.
- D. Contractor shall provide sleeves into existing walls as required.
- E. Contractor shall perform all code required disconnection of drain and water lines, and any other specific demolition work noted on the drawings.
- F. All openings, due to the removal or relocation of existing equipment or piping, shall be sealed by this Contractor; sealing material and installation shall conform to the fire and smoke rating of wall or floor in which opening occurs.

- G. Remove all existing fixtures, equipment and related piping as indicated.
- H. Waste and vent pipes which shall be removed to the stack, when possible, and capped or plugged.
- I. Supply pipes which are to be removed shall be removed back to the main or the riser, valved and capped.
- J. Remaining piping shall be capped so as to be concealed below floor, in ceiling, or in wall.
- K. Existing piping which is to be removed shall become the property of this Contractor and be removed from the project site.
- L. Existing fixtures, equipment, trim and valves removed shall remain the owner's property; equipment, etc. which the owner does not want, shall become the property of the Contractor and shall be removed from the project site.
- M. Existing fixtures or equipment to be relocated shall be removed, relocated, cleaned and connected to new piping with existing piping removed or capped as noted above.

3.4 SYSTEM INTERRUPTION

- A. Prior to interrupting any system operation, Contractor shall obtain approval for the interruption from the Owner.
- B. All work, which can be done in advance of the service interruption, shall be completed and tested prior to connecting new systems to existing.
- C. Coordinate service interruptions, with other trades requiring respective system shut-downs, to occur simultaneously to minimize the inconvenience to the Owner and occupants.

END OF SECTION

SECTION 22 05 10

EXCAVATING AND BACKFILL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Excavating trenches for utilities.
- B. Excavating for interceptors
- C. Compacted fill from top of utility bedding cover to bottom of topsoil, pavement base coarse, or bottom of floor slab
- D. Backfilling and compaction.

1.2 REFERENCES

- A. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.
- B. Specification Division 31 and 33.

1.3 DEFINITIONS

- A. Utility: Any buried pipe, duct, conduit or cable located inside or outside the building.

1.4 FIELD MEASUREMENTS

- A. Verify that survey bench mark, control point, and intended elevations for the work as shown on drawings.

PART 2 PRODUCTS

2.1 FILL MATERIALS

- A. Fill Type: As specified in Sections 22 05 11 and 22 05 12.
- B. Concrete: Lean concrete with a minimum of 1 bag of cement per cubic yard.
- C. Concrete Floors: As specified in Division 04.

PART 3 EXECUTION

3.1 PREPARATION

- A. Identify required lines, levels, contours, and datum locations.
- B. Protect trees, plant life, lawns, and other features remaining as a portion of final landscaping.

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C. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic. Maintain, protect and temporarily support above and below grade utilities which are to remain.

D. Cut out soft areas of subgrade not capable of compaction in place. Backfill with same material as utility bedding and compact to density equal to or greater than requirements for subsequent backfill material.

3.2 EXCAVATING

A. Trenching shall include all clearing, grubbing, wet, dry and rock excavation, and all incidental work such as sheet piling, shoring, underpinning, dewatering, pumping, bailing, transportation, filling and backfilling.

B. Excavate subsoil required for utilities.

C. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with work.

D. Do not interfere with 45 degree bearing splay of foundations.

E. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

F. Remove lumped subsoil, boulders, and rock.

G. Correct areas over excavated.

H. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.3 BACKFILLING

A. Backfill trenches to contours and elevations with unfrozen fill materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.

C. Granular Fill Type A3: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

D. Soil Fill Type S1: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

E. Employ a placement method that does not disturb or damage utilities in trench.

F. Maintain optimum moisture content of fill materials to attain required compaction density.

G. Remove surplus fill materials from site.

H. Leave fill material stockpile areas completely free of excess fill materials.

I. Backfill in grassed areas shall be subsoil type S1, with topsoil type S2.

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J. Backfill beneath streets shall be aggregate type A2 with base coarse type A1.

K. Backfill beneath walks, paved areas and within the building shall be aggregate type A2 with base coarse type A3.

L. All backfill material shall be compacted to achieve 95% compaction.

3.4 CONCRETE FLOOR REMOVAL AND REPLACEMENT

A. Unless specifically shown or specified to be by other Contract Divisions, sawcut, breakout, remove, haul out and replace existing concrete floors as required for the new work.

B. Where floors are to be removed by other Contract Divisions, this Contractor shall mark out areas for removal.

C. Finished floor covering will be provided by other Contract Divisions.

3.5 FIELD QUALITY CONTROL

A. Compaction testing will be performed in accordance with ASTM D1557.

B. If tests indicate work does not meet specified requirements, remove work, replace, compact, and retest.

END OF SECTION

SECTION 22 05 11

AGGREGATE MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Aggregate materials.

1.2 REFERENCES

A. Ohio building and construction codes and standards.

B. ASTM D1557 - Test methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb. Rammer and 18 inch Drop.

C. Specification Division 31 and 33.

1.3 SUBMITTALS FOR INFORMATION

A. Materials Source: Submit name of imported materials suppliers.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

PART 2 PRODUCTS

2.1 AGGREGATE MATERIALS

A. Aggregate Type A1: Conform to the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

B. Aggregate Type A2: Crushed stone, crushed stone screenings, or bedding sand. Conform to the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

C. Aggregate Type A3: Granular backfill. Conform to the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

2.2 SOURCE QUALITY CONTROL

A. Provide materials of each type from same source throughout the work.

B. Testing and analysis: Perform in accordance with ASTM D1557.

1 PART 3 EXECUTION

2 3.1 STOCKPILING

- 3 A. Stockpile new material on site at locations designated by Architect/Engineer.
- 4 B. Stockpile in sufficient quantities to meet project schedule and requirements.
- 5 C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- 6 D. Direct surface water away from stockpile site so as to prevent erosion or deterioration of
- 7 materials.

8 3.2 STOCKPILE CLEANUP

- 9 A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent
10 free standing surface water.

11 3.3 TESTS

- 12 A. Contractor shall include the cost of 3 compaction tests to be performed by an independent
13 testing laboratory. Locations to be as directed by the Architect.
- 14 B. If tests indicate materials do not meet specified requirements change materials and retest.

15 END OF SECTION

SECTION 22 05 12

SOIL MATERIALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Subsoil materials.

B. Topsoil materials.

1.2 REFERENCES

A. Ohio building and construction codes and standards.

B. ASTM D1557 - Test methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixture Using 10 lb. Rammer and 18 inch Drop.

C. Specification Division 31 and 33.

1.3 SUBMITTALS FOR INFORMATION

A. Materials Source: Submit name of imported materials suppliers.

1.4 QUALITY ASSURANCE

A. Perform work in accordance with the City of Columbus construction and materials specifications and the standard specifications for highway construction in Ohio. Refer to Specification Divisions 31 and 33.

PART 2 PRODUCTS

2.1 SUBSOIL MATERIALS

A. Subsoil Type S1:

1. Refer to Specification Division 31 and 33.

2. Excavated and reused material.

3. Graded.

4. Free of lumps larger than 3 inches, rocks larger than 2 inches and debris.

2.2 TOPSOIL MATERIALS

A. Topsoil Type S2:

1. Refer to Specification Division 31 and 33.

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2. Imported borrow.

3. Friable loam.

4. Reasonably free of roots, rocks larger than 2 inch, subsoil, debris, large weeds, and foreign matter.

5. Acidity range (pH) 5.5 to 7.5.

2.3 SOURCE QUALITY CONTROL

A. Provide materials of each type from same source throughout the work.

B. Testing and analysis: Perform in accordance with ASTM D1557.

PART 3 EXECUTION

3.1 SOIL REMOVAL

A. Excavate subsoil and topsoil from areas designated.

B. Remove lumped soil, boulders, and rock.

C. Stockpile excavated material in area designated on site and remove excess material not being used, from site.

3.2 STOCKPILING

A. Stockpile new materials on site at locations designated by Architect.

B. Stockpile in sufficient quantities to meet project schedule and requirements.

C. Separate differing materials with dividers or stockpile apart to prevent mixing.

D. Prevent intermixing of soil types or contamination.

E. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

3.3 STOCKPILE CLEANUP

A. Remove stockpile, leave area in a clean and neat condition. Grade site surface to prevent free standing surface water.

3.4 SOIL SCHEDULE

A. Comply with Specification Division 31 and 33.

B. Subsoil Type S1: Provide between utility cover material and topsoil in seeded or sodded areas.

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1 C. Topsoil Type S2: Provide at all areas to be seeded or sodded.

2 3.5 TESTS

3 A. Contractor shall include the cost of 3 compaction tests to be performed by an independent
4 testing laboratory. Locations to be as directed by the Architect.

5 B. If tests indicate materials do not meet specified requirements, change materials and retest.

6 END OF SECTION

SECTION 22 05 14

PLUMBING SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof and floor drains.
- B. Cleanouts.
- C. Backflow preventers.
- D. Water hammer arrestors.
- E. Pressure gauges.
- F. Thermometers.
- G. Interceptors.
- H. Garage catch basins.

1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Refer to Division 1 for Description of Work.

1.3 REFERENCES

- A. ANSI/ASSE 1011 - Hose Connection Vacuum Breakers.
- B. ANSI/ASSE 1012 - Backflow Preventers with Intermediate Atmospheric Vent.
- C. ANSI/ASSE 1013 - Backflow Preventers, Reduced Pressure Principle.
- D. ANSI A112.21.1 - Floor Drains.
- E. ANSI A112.21.2 - Roof Drains.
- F. ANSI A112.26.1 - Water Hammer Arrestors.
- G. ASME B40.1 - Gauges-Pressure Indicating Dial Type-Elastic Element
- H. ASSE B1017 - Performance Requirements for Temperature Actuated Mixing Valves for Primary Domestic Use.
- I. ASTM C478 - Precast Reinforced Concrete Manhole Sections.
- J. ASTM E1 - Specification for ASTM Thermometers

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- 1 K. ASTM E77 - Verification and calibration of Liquid-in-Glass Thermometers
- 2 L. UL 393 - Indicating Pressure Gauge for Fire and Protection Services
- 3 M. U.L. 404 - Gauges, Indicating Pressure for Compressed Gas Service
- 4 N. AWWA C506 - Backflow Prevention Devices - Reduced Pressure Principle and Double
- 5 Check Valve Types.
- 6 O. PDI WH-201- Water Hammer Arresters.
- 7 1.4 SUBMITTALS
- 8 A. Submit under provisions of Division 1.
- 9 B. Shop Drawings: Indicate dimensions, weights, and placement of openings and holes.
- 10 C. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.
- 11 D. Manufacturer's Installation Instructions: Indicate assembly and support requirements.
- 12 E. Manufacturer's Certificate: Certify that grease interceptors meet or exceed specified
- 13 requirements.
- 14 1.5 PROJECT RECORD DOCUMENTS
- 15 A. Submit under provisions of Division 1.
- 16 B. Record actual locations of equipment, cleanouts, backflow preventers under ground and
- 17 under floor main piping.
- 18 1.6 OPERATION AND MAINTENANCE DATA
- 19 A. Submit under provisions of Division 1.
- 20 B. Operation Data: Indicate frequency of treatment required for interceptors.
- 21 C. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly
- 22 views.
- 23 1.7 DELIVERY, STORAGE, AND HANDLING
- 24 A. Deliver, store, protect and handle products to site under provisions of Division 1.
- 25 B. Accept specialties on site in original factory packaging. Inspect for damage.
- 26 PART 2 PRODUCTS
- 27 2.1 ROOF DRAINS
- 28 A. Manufacturers:

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1 1. J. R. Smith.

2 2. Josam.

3 3. Wade.

4 4. Watts.

5 5. Zurn.

6 B. Roof Drains: ANSI A112.21.2. as indicated on the drawings.

7 2.2 DOWNSPOUT NOZZLES

8 A. Manufacturers:

9 1. J. R. Smith.

10 2. Josam.

11 3. Wade.

12 4. Watts.

13 5. Zurn.

14 B. Stainless steel round with straight bottom section with hinged perforated cover.

15 2.3 AREA DRAINS

16 A. Manufacturers:

17 1. J. R. Smith.

18 2. Josam.

19 3. Wade.

20 4. Watts.

21 5. Zurn.

22 B. Area Drain: ANSI A112.21.2; as indicated on the drawings.

23 2.4 FLOOR DRAINS

24 A. Manufacturers:

25 1. J. R. Smith.

26 2. Josam.

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1 3. Wade.

2 4. Watts.

3 5. Zurn.

4 B. Floor Drain: ANSI A112.21.1, as indicated on the drawings.

5 2.5 FLOOR SINKS

6 16 A. Manufacturers:

7 1. J. R. Smith.

8 2. Josam.

9 3. Wade.

10 4. Watts.

11 5. Zurn.

12 B. Floor Sinks: As indicated on the drawings.

13 2.6 TRENCH DRAINS

14 A. Manufacturers:

15 1. J. R. Smith

16 2. Zurn

17 B. Trench Drains: As indicated on the drawings.

18 2.7 CLEANOUTS

19 A. Manufacturers:

20 1. J. R. Smith.

21 2. Josam.

22 3. Wade.

23 4. Watts.

24 5. Zurn.

25 B. Cleanouts: As indicated on the drawings.

2.8 BACK WATER VALVES

A. Manufacturers:

1. J.R. Smith.
2. Josam.
3. Wade.
4. Zurn.

B. ANSI A112.21.2; cast iron body and cover, brass valve, access cover, extension sleeve and cover.

2.9 BACKFLOW PREVENTERS

A. Manufacturers:

1. Watts.
2. Wilkins.

B. Reduced Pressure Backflow Preventers: ANSI/ASSE 1013; bronze body with bronze and plastic internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve which opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks; Model Series 009 or 909 manufactured by Watts.

C. Double Check Valve Assemblies: ANSI/ASSE 1012; Bronze body with corrosion resistant internal parts and stainless steel springs; two independently operating check valves with intermediate atmospheric vent; assembled with valves and test cocks. Model Series 007 or 709 manufactured by Watts.

D. Backflow preventer with intermediate atmospheric vent; ASSE 1012; bronze construction with stainless steel internal parts; Model Series 9D manufactured by Watts.

E. Anti-siphon, Anti-spill Vacuum Breaker: ASSE 1056; bronze body; valves and test cocks; Model Series 008QT as manufactured by Watts.

2.10 WATER HAMMER ARRESTORS

A. Manufacturers:

1. Sioux Chief.
2. Precision Plumbing Products.

B. ANSI A112.26.1; sized in accordance with PDI WH-201, precharged suitable for operation in temperature range -100 to 300 degrees F. and maximum 250 psig working pressure;

Model Series 650 manufactured by Sioux Chief.

2.11 PRESSURE GAUGES

A. Manufacturers:

1. H. O. Trerice.
2. U. S. Gauge.
3. Ashcroft.
4. Marsh.
5. Weiss.
6. Weksler.
7. Miljoco.

B. Gauge: Cast aluminum case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.

1. Size: 4-1/2 inch diameter.
2. Mid-Scale Accuracy: One percent.
3. Scale: Units shall be in psig with system pressure near midpoint of gauge range.

C. Gauge Cock: Tee or lever handle, brass for maximum 150 psig.

D. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.

2.12 STEM TYPE THERMOMETERS

A. Manufacturers:

1. H. O. Trerice.
2. U. S. Gauge.
3. Ashcroft.
4. Marsh.
5. Weiss.
6. Weksler.
7. Miljoco.

B. Thermometer: ASTM E1, adjustable angle, blue appearing mineral spirits, lens front tube,

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cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device.

1. Size: 9 inch scale.
2. Window: Clear Lexan.
3. Stem: 3/4 inch NPT brass.
4. Accuracy: ASTM E77 2 percent.
5. Calibration: Degrees F.
6. Scale: 30 to 180.

C. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.

D. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

2.13 INTERCEPTORS

A. Manufacturers:

1. E.C. Babbert
2. Contech
3. Proceptor.
4. Xerxes.

B. Construction: Reinforced fiberglass for below grade installation, complete with inlet, outlet and vent pipes, cleanout and sample ports, extension collar and cast iron covers for H2O wheel loading, ballast and reinforced concrete relieving slab for heavy wheel loading designed for oil and solids separation.

C. Unit Rating: Refer to schedule on the drawings for capacity. Comply with manufacturer's recommendations for appropriate size for applicable area served.

2.14 GARAGE CATCH BASINS

A. Barrel: ASTM C478; precast concrete sections laid on cast-in-place reinforced concrete foundation pad, 36 inch or 42 inch diameter with precast concrete top.

B. Inlet Assembly: ASTM A48, Class 35B two piece heavy duty cast iron frame and grate with ground or machined grate and frame bearing surfaces, minimum 24" diameter opening.

C. Outlet: Elbow or inverted tee, submerged to form a trap with a water seal of six inches and terminating a minimum of 18 inches above the bottom of the catch basin.

D. Sand Trap as manufactured by E.C. Babbert or equivalent.

PART 3 EXECUTION

3.1 PREPARATION

A. Coordinate cutting and forming of roof and floor construction to receive drains to required invert elevations.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Encase exterior cleanouts in concrete flush with grade.

D. Pipe relief from backflow preventer to nearest sanitary site drain.

E. Install water hammer arrestors on water supply piping ahead of quick-closing or solenoid operated valves with a 3/8" or larger inlet opening.

F. Provide gauge cock to isolate each gauge. Extend nipples and syphons to allow clearance from insulation.

G. Install thermometers in piping systems in sockets in short couplings. Ensure sockets allow clearance from insulation and do not restrict or obstruct flow in the pipe.

H. Provide instruments with scale ranges selected according to service with largest appropriate scale.

I. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.

J. Adjust gauges and thermometers to final angle, clean windows and lenses and calibrate for accuracy.

K. Thermostatic mixing valves shall have continuous circulation across the valve, the cold water piping shall include a 27 inch drop between the heater and the connection to the cold water port of the mixing valve.

L. Backflow preventers shall be tested in accordance with applicable ASSE Standards by a certified tester. Test reports shall be submitted as required to the authority having jurisdiction.

M. Provide excavation and backfilling for interceptors. Coordinate all work with the site utility contractor.

END OF SECTION

SECTION 22 05 29

SUPPORTS, ANCHORS AND PENETRATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Pipe hangers, supports and anchors.
- B. Equipment stands.
- C. Concrete pads and curbs.
- D. Roof pipe curbs.
- E. Interior wall and floor pipe penetrations.
- F. Exterior wall and floor pipe penetrations.

1.2 REFERENCES

- A. ASME B31.1 - Power Piping.
- B. ASME B31.2 - Fuel Gas Piping.
- C. ASME B31.9 - Building Services Piping.
- D. MSS SP58 - Pipe Hangers and Supports - Materials, Design and Manufacturer.
- E. MSS SP69 - Pipe Hangers and Supports - Selection and Application.
- F. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices.
- G. ASTM C1107.
- H. ASTM C150.
- I. ASTM A185.

1.3 SUBMITTALS

- A. Product Data: Schedule of all hanger and support devices indicating shields, attachment methods and type of device for each pipe size and type of service.
- B. Manufacturer's catalog data for all pre-fabricated pipe penetrations.
- C. Manufacturer's Installation Instructions: Indicate special procedures and assembly of components.

1.4 QUALITY ASSURANCE

- A. Conform to applicable codes and standards for support of piping.

PART 2 PRODUCTS

2.1 PIPE HANGERS, SUPPORTS AND ANCHORS

- A. Manufacturers:

1. Anvil.
2. B-Line.
3. Michigan Hanger.
4. Uni Strut.
5. PHD Mfg.
6. Power Strut.

- B. Conform to ASME B31.9 MSS SP-58 and MSS SP-69.

- C. Hangers:

1. For uninsulated pipe, sizes 3 inches and under: Carbon steel, adjustable swivel ring, or adjustable clevis. MSS SP-69 Type 10 or Type 1.
2. For uninsulated pipe, sizes 4 inches and over: Carbon steel, adjustable clevis, MSS SP-69 Type 1.
3. For insulated pipe, all sizes and types: Carbon steel, adjustable, clevis, MSS SP-69 Type 1, oversized to include insulation. Adjustable swivel ring, MSS SP-69 Type 10, oversized to include insulation, is acceptable for pipe sizes 3/4" and smaller.

- D. Multiple or Trapeze Hangers:

1. Steel channels with welded spacers and hanger rods.
2. Strut shall be 1-5/8" wide in heights and welded combinations as required to meet load capacities.
3. Strut shall be ASTM A570 Grade 33 steel.
4. Strut fittings shall be ASTM A907 Grade 33.
5. Strut and fittings shall be epoxy painted.
6. Threaded hardware shall be zinc plated.

E. Wall Support:

1. Pipe sizes 2 inches and under: Carbon steel hook.
2. Pipe sizes 2-1/2 inches and over: Welded steel bracket and MSS SP-69 Type 32 or 33 and steel clamp.

F. Vertical Support: Steel riser clamp, MSS SP-69 Type 8.

G. All supports, fasteners, clamps, etc. directly connected to copper piping shall be copper plated, or polyvinylchloride coated; or provided with an isolation collar or wrap between the supports, fasteners, or clamps and the copper pipe.

H. Accessories:

1. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded, black finish with adjusting locknuts.

2. Beam Clamps:

- a. MSS SP-69 Type 23 malleable black iron clamp for attachment to beam flange for use with pipe sizes 4 inches and less. Furnish with a hardened steel cup point set screw.
- b. MSS SP-69 Type 28 or Type 29 forged steel jaw type clamp with a tie rod to lock clamp in place, suitable for rod sizes to 1-1/2 inch diameter but limited in application to pipe sizes 8 inches and less without prior approval.

3. Structural and miscellaneous steel:

- a. Angles, channels, and beams: ASTM A36 and A572 as required.
- b. Tubing: ASTM A500 Grade B.
- c. Unfinished bolts: ASTM A307, Grade A, length required with no threads in contact with bearing surfaces, fitted with self-locking nuts and washers.

4. Concrete Inserts:

- a. MSS SP-69 Type 18 wedge type or universal concrete inserts for pipes 8" and under.
- b. Wedge type: Black carbon steel body with a removable malleable iron nut that accepts threaded rod to 7/8 inch diameter. Wedge design to allow the insert to be held by concrete in compression to maximize the load carrying capacity.
- c. Universal type: Black malleable iron body with a removable malleable iron nut that accepts threaded rod to 7/8 inch diameter.
- d. Use drilled steel shell with plug type inserts when the inserts are placed after the concrete is poured.
- e. Powder actuated anchors are not acceptable.

5. Continuous Concrete Insert Channels:

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- 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.
- b. Load rating of 2000 pounds per foot in concrete.
- c. Manufacturer's standard brackets, inserts, and accessories designed for the channel inserts may be used.
- d. Select insert length to accommodate all pipe, duct, and conduit in the area.

6. Shields: Galvanized, carbon steel, half round, MSS 69, Type 40.

I. Powder actuated anchors are not acceptable.

2.2 EQUIPMENT STANDS

A. Contractor fabricated stand consisting of structural steel members supported by pipe supports. Galvanized where exposed to weather.

2.3 CONCRETE PADS AND CURBS

A. Concrete:

1. Design mix (strength at 28 days): 3500 psi, 3/4" mix aggregate, 2"-4" slump.
2. Portland Cement: ASTM C150, Type 1.
3. Water: Potable.
4. Welded Wire Fabric: ASTM A185, 6 x 6-W1.4 x W1.4.

B. Grout:

1. ASTM C1107. Grade B, non-shrink, non-metallic, post-hardening, volume adjusting, dry, hydraulic-cement-type grout.
2. Non-staining, non-corrosive, non-gaseous.
3. Suitable for both interior and exterior.
4. Design Mix: 5000 psi, 28 day compressive strength.

2.4 ROOF PIPE CURBS

A. Manufacturers:

1. Custom curb.
2. Pate.
3. Roof Product and Systems.
4. ThyCurb.

5. Vent Products.

B. Curb Construction:

1. Continuously welded, 18 gauge, galvanized steel shell.

2. Integral base plate.

3. 3 lb. density, 1-1/2" thick rigid insulation.

4. 2" x 2" treated wood nailer.

5. Compensate for roof pitch for level installation.

C. Minimum height above deck, 12".

D. Cover: Acrylic clad thermoplastic cover, galvanized fastening screws, graduated step boots with stainless steel clamps.

2.5 INTERIOR WALL AND FLOOR PIPE SLEEVES

A. Material: Minimum 18 gauge galvanized steel for walls and steel pipe for floors.

B. Diameter: One inch larger than outside diameter of the pipe, conduit or pipe insulation.

C. Length: Sufficient length to pass thru wall or floor. Sleeves in Mechanical Room floors shall extend 6" above finished floor.

2.6 PIPE PENETRATIONS THROUGH EXTERIOR WALLS AND FLOORS

A. Manufacturers:

1. Thunderline Link-Seal.

B. Modular, mechanical type consisting of interlocking synthetic rubber links shaped to continuously fill annular space between pipe and wall opening, elastomeric element sized and selected per manufacturers recommendations and have the following properties as designated by ASTM:

1. -40°F. to 250° F.: EPDM, ASTM D2000 M3 BA510.

2. -67° F. to 400° F.: Silicone, ASTM D2000 M1 GE505.

C. Sleeves:

1. New concrete walls and floors: Pre-formed HPDR thermoplastic, integral waterstop and reinforcing ribs, nailer end caps.

2. Existing concrete walls and floors: Core-drilled opening.

3. Masonry walls: Schedule 40 steel pipe grouted in place.

2.7 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.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide all supporting steel, not indicated on drawings, that is required for installation of mechanical equipment and materials, including angles, channels, beams, etc.
- C. Support all piping from the structure.

3.2 PIPE HANGERS AND SUPPORTS

- A. Size hangers for insulated piping to accommodate thickness of insulation. Hangers and supports shall be placed on the exterior of the pipe insulation, except for riser clamp floor supports used on vertical piping.
- B. Pipe hangers shall be spaced in accordance with the manufacturer's recommendations and per applicable codes.
- C. Isolate copper piping from dissimilar metal hangers, supports and clamps.
- D. Install hangers to provide minimum 2 inch space between finished covering and adjacent work.
- E. Place hangers within 12 inches of each horizontal elbow.
- F. Use hangers with 1-1/2 inch minimum vertical adjustment.
- G. Support vertical piping at every floor.
- H. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers. Piping shall be clamped at each support location. Strut clamps, where not required for pipe support, shall be used as a guide on trapeze hangers.
- I. Support riser piping independently of connected horizontal piping.
- J. Design hangers for pipe movement without disengagement of supported pipe.
- K. Adjust hangers to obtain the slope specified in the appropriate piping section.
- L. Provide insulation protection shields at hanger and support locations on all insulated piping.

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1 M. Prime coat exposed steel hangers and supports in following locations:

2 1. Roof mounted locations.

3 N. Provide hangers, rods, and accessories hot dipped galvanized after fabrication in the
4 following locations:

5 1. Exterior locations.

6 2. Tipping Floor.

7 O. Where piping and equipment hangers occur in areas designated to receive spray-on
8 fireproofing:

9 1. Secure all hangers, support members, beam clamps, etc. which is required to
10 support piping and equipment from the framing system designated to receive
11 spray-on fireproofing, before the spray-on material is applied.

12 2. After the spray-on material is applied, complete the installation of the suspension
13 components, and then install the pipe and equipment.

14 3. This Contractor shall be responsible to determine the areas specified to receive
15 spray-on fireproofing and schedule his work accordingly.

16 4. This Contractor shall not be allowed to remove any sprayed-on fireproofing
17 material in order to attach his hangers and supports.

18 3.3 INSERTS

19 A. Provide inserts for placement in concrete formwork.

20 B. Provide inserts for suspending hangers from reinforced concrete slabs and sides of 37
21 reinforced concrete beams.

22 C. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4
23 inches.

24 D. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.

25 3.4 EQUIPMENT STANDS

26 A. Use structural steel members welded to and supported by pipe supports. Clean, prime and
27 coat with three coat rust inhibiting alkyd paint or one coat epoxy mastic.

28 B. Where exposed to weather, treat with corrosive atmosphere coatings.

29 3.5 ROOF PIPE CURBS

30 A. Turn curbs over to the appropriate Contractor for installation (turnover point shall be on
31 the roof at point of installation).

32 B. Contractor shall install (set and secure) curbs.

3.6 CONCRETE PADS AND CURBS

- A. Provide pads for all floor mounted equipment including water meters, water heaters, tanks, softeners, pumps, compressors, etc.
- B. Provide housekeeping pads of concrete, minimum 3-1/2 inches thick and extending 6 inches beyond the plan view of the equipment.
- C. Provide 1" chamfer on all concrete pads.
- D. Bond pads to concrete slabs with hooked dowel rods.
- E. Provide templates, anchor bolts, and accessories for mounting and anchoring equipment.
- F. Brace and fasten supports with flanges bolted to structure.

3.7 INTERIOR WALL AND FLOOR PENETRATIONS

- A. Piping:
 - 1. Thru walls where drywall or masonry does not extend to structure: No special requirements.
 - 2. Thru walls where drywall, concrete, or masonry extends to structures and thru floors:
 - a. For new concrete walls and floors, furnish and install sleeves.
 - b. For new masonry walls, furnish sleeves to the appropriate contractor for installation. Provide sleeve layout.
 - c. For new fire rated drywall walls, furnish and install sleeves.
 - d. For non-rated drywall walls, no sleeve is required.
 - e. For existing masonry walls, provide sleeve and grout sleeve in wall.
 - f. Fill void between pipe or insulation and wall, floor or sleeve with mineral wool.
 - g. Non-rated walls and floors: Caulk both sides with non-hardening caulk.
 - h. Rated walls and floors: Seal both sides with UL rated firestop system.
 - 3. Thru precast deck:
 - a. Core-drill hole thru topping and pre-cast deck. No sleeve is required.
 - b. Fill void between pipe or insulation and floor with mineral wool.
 - c. Seal both sides with UL rated firestop system.
 - 4. Thru precast deck with waterproof membrane:
 - a. Core-drill hole thru pre-cast deck. Furnish and install sleeve to attach top of pre-cast deck. Sleeve shall extend minimum 2" above top of topping and shall be used for attaching membrane and as concrete stop.
 - b. Fill void in pre-cast plank for holes 4" and larger before installing pipe.
 - c. Fill void between pipe or insulation and floor with mineral wool.
 - d. Seal both sides with UL rated firestop system.

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1 B. Install chrome plated steel escutcheons at penetrations exposed in finished rooms.

2 END OF SECTION

SECTION 22 05 53

IDENTIFICATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates.
- B. Tags.
- C. Stencils.
- D. Pipe Markers.

1.2 REFERENCES

- A. Ohio Plumbing Code
- B. ASME/ANSI A13.1 - Scheme for the Identification of Piping Systems.

1.3 SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Product Data: Provide manufacturers catalog literature for each product required.

1.4 CONTRACT CLOSEOUT SUBMITTALS

- A. Submit under provisions of Division 1.
- B. Submit valve chart and schedule, including valve tag number, actual location, function, size and valve manufacturer's name and model number.
- 31 C. For additions and remodeling projects, the new valve numbers shall be a continuation of the existing numbering system; as directed by the Owner.

PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Manufacturers:
 - 1. W.H. Brady.
 - 2. Seton Name Plate Company.
- B. Description: 3/4" high, 1/16" thick plastic with engraved white letters on dark contrasting background color, beveled edges, screw mounting. Provide adhesive mounting where it is

not feasible to attach plate with screws.

2.2 TAGS

A. Manufacturers:

1. W.H. Brady.
2. Seton Name Plate Company.

B. Plastic Tags: 1/16" thick laminate plastic with engraved letters on contrasting background color. Color to match color used for pipe markers. Tag size minimum 1-1/2 inch diameter.

C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

D. Chart: Typewritten letter size list in anodized aluminum frame.

2.3 STENCILS

A. Stencils: With clean cut symbols and letters of following size:

1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.
3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
6. Equipment: 2-1/2 inch high letters.

B. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

2.4 PIPE MARKERS

A. Manufacturers:

1. W.H. Brady.
2. Seton Nameplate Company.

B. Color: Conform to ASME A13.1.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive

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backing and printed markings; secure with 2" wide tape with arrows indicating flow.

- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

PART 3 EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.

- B. Prepare surfaces in accordance with specification section for painting.

3.2 INSTALLATION

- A. Nameplates:

1. Install with corrosive-resistant mechanical fasteners or adhesive.

2. Locations:

- a. Control panels.
b. Starters.

- B. Tags:

1. Install with brass chain and "S" hooks around valve stem.

2. Locations:

- a. Main and branch piping valves.
b. Fixture stops shall not be tagged.

- C. Stencil:

1. Apply in accordance with the painting specification section..

2. Locations:

- a. Water heaters.
b. Storage tanks.
c. Pressure tanks.
d. Piping:
1). Exposed.
2). Concealed in accessible spaces.

- D. Pipe markers:

1. Install in accordance with manufacturer's instructions.

2. Locations:

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a. Piping:

- 1). Exposed.
- 2). Concealed in accessible spaces

3. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe; outside of the building footprint.

E. Pipe identification:

1. Identify service and flow direction on all new piping of this division.
2. Install identification in clear view and align with axis of piping. Locate identification not-to-exceed 20 feet or straight runs including risers and drops, adjacent to each valve and tee, at each side of penetration of structure or enclosure, at each obstruction, and within 5 feet of each access panel.

3. Identification wording:

Domestic Cold Water
Domestic Hot Water
Domestic Hot Water Return
Non-Potable Cold Water
Tempered Water
Sanitary Waste
Sanitary Vent
Storm Water
Clear Water Waste
Clear Water Vent
Natural Gas
Compressed Air

END OF SECTION

SECTION 22 13 00

DRAIN, WASTE, VENT AND CONDUCTOR PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Sanitary piping system.
- B. Storm and clear water piping system.
- C. Sump pump discharge piping.

1.2 REFERENCES

- A. ANSI B31.9 - Building Service Piping.
- B. ASME B16.1 - Cast Iron Pipe Flanges and Flanged Fittings Class 25, 125, 250 and 800.
- C. ASME B16.4 - Cast Iron Threaded Fittings Class 125 and 250.
- D. ASME B16.23 -Cast Copper Alloy Solder-Joint Drainage Fittings - DWV.
- E. ASME B16.29 -Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV.
- F. ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc Coated, Welded and Seamless.
- G. ASTM A74 - Hub and Spigot Cast Iron Soil Pipe and Fittings.
- H. ASTM A888 - Hubless Cast Iron Soil Pipe and Fittings.
- I. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Uses.
- J. ASTM B32 - Solder Metal.
- K. ASTM B88 - Seamless Copper Water Tube.
- L. ASTM C14 - Concrete Sewer, Storm Drain, and Culvert Pipe.
- M. ASTM C425 - Compression Joints for Vitrified Clay Pipe and Fittings.
- N. ASTM C443 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
- O. ASTM C564 - Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- P. ASTM D1785 - Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80 and 120.

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- 1 Q. ASTM D2241 - Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR).
- 2 R. ASTM D2466 - Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
- 3 S. ASTM D2564 - Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe and
4 Fittings.
- 5 T. ASTM D2665 - Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe and
6 Fittings.
- 7 U. ASTM D2729 - Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- 8 V. ASTM D2855 - Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe
9 and Fittings.
- 10 W. ASTM D3033 - Type PSP Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- 11 X. ASTM D3034 - Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
- 12 Y. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- 13 Z. CISPI 301 - Hubless Cast Iron Soil Pipe and Fittings for Sanitary and
14 Storm Drain, Waste and Vent Piping Applications.
- 15 AA. CISPI 310 - Couplings for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and
16 Storm Drain, Waste and Vent Piping Applications.

17 1.3 SUBMITTALS

- 18 A. Submit under provisions of Division 1.
- 19 B. Product Data: Provide data on pipe materials, pipe fittings and accessories. Provide
20 manufacturers catalog information.
- 21 C. Cast iron service weight and no hub pipe and fittings shall be manufactured by a member
22 of the cast iron soil pipe institute: AB & I, Charlotte and Tyler.

23 1.4 PROJECT RECORD DOCUMENTS

- 24 A. Submit under provisions of Division 1.
- 25 B. Record actual locations of cleanouts.
- 26 C. Record actual locations and elevations of underground piping.

27 1.5 OPERATION AND MAINTENANCE DATA

- 28 A. Submit under provisions of Division 1.

1.6 REGULATORY REQUIREMENTS

- A. Perform work in accordance with State of Ohio plumbing code. Materials and installation of materials shall comply with the contract documents and applicable governing codes.
- B. Comply with applicable local ordinances and requirements for installation of storm water drainage systems.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not install underground piping when bedding material is saturated or frozen.

PART 2 PRODUCTS

2.1 SANITARY PIPING, EXTERIOR AND INTERIOR BELOW GROUND

- A. Cast Iron Pipe: ASTM A74, service weight.
 - 1. Fittings: ASTM A74 cast iron.
 - 2. Joints: ASTM C564, neoprene gasket system.
- B. Cast Iron Pipe: CISPI 301, hubless.
 - 1. Fittings: CISPI 301 cast iron.
 - 2. Joints: Stainless steel clamp-and-shield assemblies with ASTM C564 gaskets.
- C. PVC Pipe: ASTM D1785.
 - 1. Fittings: PVC, ASTM D2665.
 - 2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

2.2 CONTAINMENT PIPING

- A. PVC Pipe: ASTM D1785.
 - 1. Fittings: PVC, ASTM D2665.
 - 2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

2.3 SANITARY PIPING, NOT IN GROUND

A. Cast Iron Pipe: CISPI 301, hubless.

1. Fittings: CISPI 301, hubless.

2. Joints: CISPI 310, Stainless steel clamp-and-shield assemblies with ASTM C564 gaskets. For sizes 4" and larger, provide heavy-duty couplings manufactured by Clamp-All, Mission, Husky, or equivalent.

B. Copper Tubing: ASTM B88, Type M.

1. Fittings: ASME B16.23, cast bronze or ASTM B16.29 wrought copper.

2. Joints: ASTM B32, solder, Grade 50B.

C. Steel Pipe: ASTM A53, Schedule 40, galvanized.

1. Cast Iron Fittings: ASME B16.4, screwed fittings.

D. PVC Pipe: ASTM D1785, Schedule 40 DWV.

1. Fittings: PVC, ASTM D2665.

2. Joints: ASTM D2855, solvent weld with ASTM D2564 solvent cement.

2.4 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING AND INTERIOR BELOW GROUND

A. Cast Iron Pipe: ASTM A74 service weight.

1. Fittings: ASTM A74 cast iron.

2. Joints: ASTM C564, neoprene gasket system.

B. Cast Iron Pipe: CISPI 301, hubless, service weight.

1. Fittings: CISPI 301 cast iron.

2. Joints: tainless steel clamp-and-shield assemblies with ASTM C564 gaskets.

C. PVC Pipe: ASTM D1785.

1. Fittings: PVC, ASTM D2665.

2. Joints: ASTM D2855, solvent weld.

2.5 STORM WATER PIPING, NOT IN GROUND

A. Cast Iron Pipe: CISPI 301, hubless, service weight.

1. Fittings: CISPI 301 cast iron.

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- 1 2. Joints: CISPI 310, Stainless steel clamp-and-shield assemblies with ASTM C564
- 2 gaskets. For sizes 4" and larger, provide heavy-duty couplings as manufactured by
- 3 Clamp-All, Mission, Husky, or equivalent.
- 4 B. Copper Tube: ASTM B88, Type M.
- 5 1. Fittings: ASME B16.23, cast bronze, or ASME B16.29, wrought copper.
- 6 2. Joints: ASTM B32, solder, Grade 50B.
- 7 C. PVC Pipe: ASTM D1785, Schedule 40 DWV.
- 8 1. Fittings: PVC, ASTM D2665.
- 9 2. Joints: ASTM D2855, solvent weld.
- 10 2.6 SUMP PUMP DISCHARGE PIPING
- 11 A. Copper tubing: ASTM B88, Type M.
- 12 1. Fittings: ASME B16.23 cast bronze or ASTM B16.29 wrought copper.
- 13 2. Joints: ASTM B32, solder, Grade 50B.
- 14 B. Steel pipe: ASTM A53, Schedule 40, galvanized.
- 15 1. Cast iron fittings: ASME B16.4 screwed fittings.
- 16 C. Cast Iron Pipe: ASTM A74, service weight.
- 17 1. Cast iron fittings: ASME B16.4 screwed
- 18 2.7 SUMP PUMP DISCHARGE VALVES
- 19 A. Gate:
- 20 1. For 2" and smaller: bronze body, solid wedge, rising stem, 300 psi, Nibco 134.
- 21 2. For 2-1/2" and larger: iron body, OS & Y solid wedge Nibco F-617-0.
- 22 B. Ball:
- 23 1. Two-piece bronze body, Nibco 585-70.
- 24 C. Swing Check (sanitary):
- 25 1. 2" and smaller; bronze body, stainless steel trim, Nibco 413B.
- 26 2. 2-1/2" and larger; cast iron body, outside lever and weight, Nibco F918B
- 27 D. Spring Check (clearwater):

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1. 2" and smaller; bronze body, stainless steel trim, Nibco 480Y.
2. 2-1/2" and larger; cast or ductile iron body, bronze and stainless steel trim, Nibco W910 or F910.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plan end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Keep all open ends of piping closed with pipe plugs or caps at all times except when work is in progress.

3.2 INSTALLATION

- A. All work shall be constructed in an approved manner to the complete satisfaction of the owner's representative and authorities having jurisdiction.
- B. Install in accordance with manufacturer's instructions.
- C. Route piping in orderly manner and maintain gradient.
- D. Install piping to conserve building space and not interfere with use of space. Piping shall be concealed within walls and chases or above ceilings. Obtain approval of the owner's representative prior to installing exposed piping.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance for installation of insulation.
- H. Establish elevations of buried piping outside the building to ensure not less than the minimum amount of cover as required by code and as recommended by the pipe manufacturer.
- I. Verify existing and proposed sewer elevations in the field and notify the owner's representative in writing of any variation of the elevations noted on the drawings before any sewer and building drain work is begun.
- J. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting. Refer to specification section for painting.
- K. Provide excavation and backfill for work of this Section.
- L. Install bell and spigot pipe with bell end upstream.
- M. All drain and waste branch connections and changes of directions more than 45 degrees

shall be made with wyes and 1/8 bends, or as indicated.

N. In-ground fittings located at the base of drain and waste stacks and conductors shall be long sweep type.

O. Materials having cracks or sand holes will not be allowed and shall be replaced.

P. Cleanout connections in sewer lines shall be made with wyes and 1/8 bends.

Q. Cleanouts at ends of sewers shall be made with two 1/8 bends or a long sweep 1/4 bend.

R. All drain lines and traps receiving wastes in excess of 140 degrees shall be metal pipe and fittings, downstream of hot water entry into the waste system, to a point where other fixture drain branches connect to the line, but not less than 20 feet.

S. Do not route waste piping over food preparation areas or over electrical equipment and its related service area.

T. Plastic materials used in return air ceiling plenums shall meet fire rating requirements for flame spread and smoke generation. Plastic piping materials shall be insulated in accordance with building code requirements.

3.3 ERECTION TOLERANCES

A. Establish invert elevations, slopes for drainage to 1/4 pitch per foot for piping up to and including 2" and 1/8" pitch per foot for piping larger than 2".

3.4 TESTING

A. Every section of the piping systems provided under this specification section shall be tested under a minimum 10 foot head of water or an air pressure of 5 psig for a period of 15 minutes, without a drop in water level or air pressure.

B. Submit reports to the architect and engineer.

3.5 SERVICE CONNECTIONS

A. Provide new sanitary and storm sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

END OF SECTION

SECTION 22 30 00

PLUMBING EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pumps.

1.2 REFERENCES

A. NEMA 250 - Enclosure for Electrical Equipment (1000 Volts Maximum).

1.3 SUBMITTALS

A. Submit under provisions of Division 1.

B. Manufacturer's Installation Instructions.

1.4 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

B. Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with applicable codes and standards.

B. Provide pumps with manufacturer's name, model number, and rating/capacity identified.

C. Ensure products and installation of specified products are in conformance with recommendations and requirements of the following organizations:

1. American Society of Mechanical Engineers (ASME).

2. National Electrical Manufacturers' Association (NEMA).

3. Underwriters Laboratories (UL).D. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

1.6 REGULATORY REQUIREMENTS

A. Conform to ASME standards for commercial, institutional or industrial installations, where applicable.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 1.
- B. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

2.1 SUBMERSIBLE SUMP PUMPS

A. Manufacturers:

- 1. Zoeller.
- 2. Other acceptable manufacturers offering equivalent products.
 - a. ABS.
 - b. Goulds.
 - c. Weil.
 - d. Liberty

B. Performance:

- 1. As scheduled on the drawings.

C. Type: Completely submersible vertical centrifugal.

D. Casing: Cast iron pump body and oil or air filled motor chamber.

E. Impeller: Cast iron, open non-clog, stainless steel, corrosion resistant alloy steel shaft.

F. Bearings: Ball bearings.

G. Accessories: Oil resistant 15 foot cord for connection to electric wiring system connector.

H. Motor control panel containing across-the-line electric motor starters with ambient compensated quick trip overloads in each phase with manual trip button and reset button, circuit breaker, control transformer, electro-mechanical alternator, hand-off-automatic selector switches, pilot lights, high water alarm pilot light, reset button and alarm horn. Provide mercury switch liquid level controls, steel shell switch encased in polyurethane foam with cast iron weight for pump on, pump off, and alarm.

PART 3 EXECUTION

3.1 PUMP INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Ensure shaft length allows sump pumps to be located minimum 24 inches below lowest invert into sump pit and minimum 6 inches clearance from bottom of sump pit.
- C. Provide air cock and drain connection on horizontal pump casings.

1	D.	Provide line sized isolating valve and strainer on suction and line sized soft seated check
2		valve and balancing valve on discharge.
3	E.	Decrease from line size with long radius reducing elbows or reducers. Support piping
4		adjacent to pump such that no weight is carried on pump casings.
5	F.	Ensure pumps operate at specified system fluid temperatures without vapor binding and
6		cavitation, are non-overloading in parallel or individual operation, and operate within 25
7		percent of midpoint of published maximum efficiency curve.
8	G.	Align and verify alignment of base mounted pumps prior to start-up.

9

SECTION 26 05 00

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Basic Electrical Requirements specifically applicable to Division 26 Sections, in addition to Division 1 - General Requirements.

1.2 WORK INCLUDED IN THE ELECTRICAL CONTRACT

- A. The mention of any article, operation, material, or method requires that the Contractor shall provide same, of quality noted, in the quantity required, and shall perform each operation, in complete accordance with the conditions stated. The Contractor shall provide all material, labor, equipment and transportation as necessary to complete the project in conformity with the Contract Documents. In general, this work includes everything essential for a complete electrical system in operating order as shown or implied on the drawings or herein-after specified.

- B. Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for delivery, erection and installation of all equipment and apparatus required to be installed by the Contractor. The Contractor upon completion of the project shall remove all equipment.

1.3 CONTRACTOR IDENTIFICATION

- A. Wherever in this specification the word "Contractor" appears, either as word or part of a word, it is meant to refer to the Contractor or Subcontractor performing the required work of their respective Divisions.

- B. Wherever in this specification the words "man", "men", or their related pronouns may appear, either as words or parts of words, they have been used for literary purposes and are meant in their generic sense to include all humankind - both female and male sexes.

- C. Definitions:

1. Provide: Furnish, install and wire complete and ready for service.
2. Furnish: Responsible for purchasing item and also delivery to the jobsite.
3. Install: Responsible for moving and mounting equipment to the final location.
4. Wire: Responsible for final connections, ready for service.
5. Exposed: Exposed to view in any room, corridor or stairway.
6. This Contractor: The Electrical Contractor, also referred to as The Contractor.
7. The Engineer: Ring & DuChateau, Inc. Wauwatosa, WI.

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8. Code: National, State and Local Electrical codes including OSHA requirements.
9. The Owner's Representative: The individual who the Owner selects as his project representative.
10. Equals: Manufacturers or methods listed by name in the specifications, on the drawings or in an addendum are considered to be equals.
11. Substitution: Any manufacturer or method other than those listed by name in these specifications, on the drawings, or in an addendum.
12. The Architect: Bloom Companies, LLC
13. Owner: SWACO/SHAW

1.4 PERMITS, CODES, ORDINANCES, STANDARDS AND SALES TAX

- A. Contractor shall obtain and pay for all necessary permits and licenses pertaining to this Division.
- B. Contractor shall comply with National, State and local Codes, laws, ordinances and regulations. The requirements of the National Board of Fire Underwriters, OSHA or anything herein specified or shown on the drawings unless noted otherwise.
- C. The Contractor shall pay all sales taxes as may be required.
- D. Should any change in the plans and specifications be required to conform with the above, the Contractor shall notify the Architect/Engineer before submitting a Bid. After entering into a contract, the Contractor shall be required to complete all work necessary to meet the above requirements without extra expense to the Owner.
- E. All materials shall have a U.L. label where a U.L. Standard and/or test exists.

1.5 DRAWINGS

- A. The drawings depicting electric work are diagrammatic and show, in their approximate location, symbols representing electrical equipment and devices. The exact location of such equipment and devices shall be established in the field in accordance with instructions from the Architect.
- B. Contractor shall furnish and install all such work, piping, structural supports, electrical wiring and conduit and any other additional equipment for a complete operational system.
- C. Unless specifically stated to the contrary, no measurement of an electrical drawing by scale shall be used as a dimension. Dimensions noted on the electrical drawings are subject, in each case, to measurements of adjacent or previously completed work and all such measurements necessary shall be taken before undertaking any work dependent upon them.
- D. In the event of a conflict between the drawings and specifications this Contractor shall base his bid on the greater quantity, cost or quality of the item in question, unless such conflict is resolved by an addendum.

1.6 MATERIALS AND EQUIPMENT

- A. All materials and equipment required shall be new, and shall be installed per the manufacturer's recommendation.
- B. All items specified shall be the latest type or model produced by the manufacturer specified. If descriptive specification or model number is obsolete, substitute current product.

1.7 APPROVALS

- A. Contractor shall, within a maximum of 30 days of award of Contract, submit a complete list of all Subcontractors, equipment and material manufacturers whose products are proposed for the project under the conditions outlined in the specifications. Submittal of the Bill of Material shall be prior to ordering equipment.
- B. The Engineer shall return one copy of the Bill of Material submitted with his comments indicated thereon or in accompanying letter of transmittal. Where items of equipment are indicated "rejected", the Contractor shall resubmit the name of alternative manufacturer for consideration.
- C. It is hereby understood that review of the Bill of Material with "no exceptions taken" constitutes a review to place orders and does not relieve the Contractor from submitting shop drawings for review.
- D. Intent to furnish exact items specified does not relieve the Contractor from submitting the above list.
- E. Where any specific equipment, materials, process or method of construction is specified by name or by reference to the catalog number of a manufacturer, the specifications shall be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the drawings.

1.8 SUBSTITUTIONS

- A. Contractor shall provide all supporting data and assume the "burden of proof" that any substitute proposed is equivalent as to appearance, construction, capacity and performance.
- B. Where an item of equipment not shown on the drawings is accepted and the use of such equipment shall require any redesign of structure, foundations, utilities, piping, wiring or of any other part of the architectural, structural, mechanical, plumbing, sitework, or electrical work, the cost of all such redesign, drawings, detailing and accompanying additional costs of any item of work shall be paid for by the Contractor and such redesign shall be subject to the approval of the Architect/Engineer and all authorities having jurisdiction over the work.
- C. In any case where the Contractor wishes to use equipment or methods other than those listed by name in the Contract Documents, such equipment shall be considered a substitution and must be approved by the Engineer. To gain approval of substitutions, the Contractor shall submit the following to the Engineer for his review.

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1. Documentation from the equipment manufacturer indicating where this equipment meets and does not meet the specifications or drawings as written. This documentation shall be submitted in letter form and shall include the manufacturer's letterhead.
2. Manufacturer's cut sheets. (3 copies). Cut sheets shall be originals as are contained in the manufacturer's catalog. Cut sheets shall contain all pertinent information for determining equivalency. Photocopies of these sheets will not be accepted for review.
3. In the case of lighting fixtures, the Contractor shall submit photometric data compiled by an independent testing laboratory. Photometric data shall be provided in paper copy and in electronic form in IES format. Provide point by point and other calculations as requested by the Engineer. This data shall contain the independent testing laboratory's label and the manufacturer's letterhead.
4. If requested by the Engineer, the Contractor shall also provide samples of the proposed equipment for the Engineer's review.
5. Evidence shall be furnished in writing with substitution submittals that there is an efficient service organization which regularly carries a stock of repair parts for the proposed equipment and that the organization is conveniently located for prompt service.
6. In each case the Contractor shall furnish any other information or materials as considered necessary by the Architect/Engineer to establish equality.
- D. The Contractor shall also affix his review and/or approval stamp to all documentation submitted indicating they are in order and equal to the items specified.
- E. Without the above documentation, photometric data, original cut sheets and Contractor's stamp; the submittal will be rejected without review.
- F. Any substitution submittals including samples shall be received in the Architect/Engineer's office a minimum of ten working days prior to the Bid due date to allow adequate time for review. No consideration will be given to requests for substitution approval not conforming to these requirements.
- G. Materials, equipment, or methods of installation other than those named will be accepted only if such materials, equipment or methods are in accordance with the general requirements and are similar in composition, dimension, construction, capacity, finish and performance.

1.9 SHOP DRAWINGS

- A. After receiving approval of proposed equipment and material submittals in accordance with "Approvals" above, submit shop drawings, certified by the original manufacturer, for each item of electrical equipment and appurtenances required for this project, as indicated below:
 1. Short Circuit & Coordination Study.
 2. Circuit Breakers.

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- 1 3. Panelboards.
- 2 4. Transformers.
- 3 5. Disconnect Switches.
- 4 6. Generators.
- 5 7. Transfer Switches.
- 6 8. Transient Voltage Surge Suppression.
- 7 9. Multi-outlet assemblies.
- 8 10. Lighting Fixtures.
- 9 11. Lighting Controls.
- 10 12. Occupancy Sensors.
- 11 13. Security Systems.
- 12 14. Sound and Paging Systems.
- 13 15. Telecommunications Cabling and Outlets.
- 14 B. The Contractor shall affix his review and/or approval stamp to all documentation submitted
15 indicating they are in order and equal to the items specified. The Engineer will reject all
16 shop drawings that lack the Contractor's review and/or approval stamp. The Engineer shall
17 also reject all shop drawings not reviewed by the Contractor.
- 18 C. Shop drawings submitted to the Architect/Engineer for review does not constitute
19 notification of substitution unless specific changes are brought to the attention of the
20 Architect/Engineer.
- 21 D. Submit the quantities of shop drawings as requested by the Architect/Engineer.
- 22 E. Review of shop drawings shall not be considered as a guarantee of measurements of
23 building conditions.
- 24 F. Engineer's review of Shop Drawings shall not relieve Contractor from the responsibility
25 for any variation from the requirements of the Contract Documents.
- 26 G. The Contractor shall submit dimensional drawings for all electrical equipment rooms,
27 requiring working clearances.
- 28 H. Failure to submit shop drawings in ample time for review shall not entitle the Contractor
29 to an extension of contract time, and no claim for extension by reason of such default shall
30 be allowed.
- 31 I. Physical dimensions of shop drawings submitted for review shall not exceed 8-1/2" X 11"
32 unless impossible to illustrate data properly without using a larger sheet.

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- J. If more than one type of lighting fixture (or other materials) is on a submitted sheet, the Electrical Contractor shall conspicuously check the item submitted with a red pen.
- K. The shop drawings shall reference all equipment designation on the drawings, such as panelboard designations. For equipment without designation, utilize the designation of the load, such as Motor #1 for a motor starter.
- L. No materials or equipment subject to prior review by the Engineer shall be fabricated or installed by the Contractor, without such review and approval.
- M. The use of the construction drawings as shop drawings is not acceptable.
- N. All fluorescent dimming ballasts and fluorescent dimming controls shall be submitted simultaneously, and preferably as a single shop drawing submittal. The shop drawings will be rejected if this requirement is not met.
- O. See other sections of this specification for additional requirements.

1.10 DRAWINGS FOR REVIEW

- A. The Contractor shall provide the following drawings at the request of the Engineer or if the Contractor proposes an alternate layout for an electrical/telecommunications room or closet.
- B. Provide a 1/4" scaled floor plan of:
1. Electrical equipment rooms/closets
 2. Electrical systems/communications rooms/closets
 3. Where telecommunications wiring is by the Electrical Contractor:
 - a. Detailed layout of each telecommunications rooms/closets.
 - b. Detailed front and rear elevations of each equipment rack(s) install or modified as part of this project.
- C. The drawings shall depict actual room and equipment dimensions, specifically noting the clearance dimensions.
- D. The scaled floor plan shall indicate the locations of all electrical distribution equipment along with all other electrical or communications equipment located in the room but not limited to the following"
1. Paging and miscellaneous sound system equipment.
 2. Fire alarm equipment.
 3. Television distribution equipment.
 4. Nurse call equipment.

5. Master clock equipment.

6. Intercom equipment.

7. Security equipment.

1.11 PROJECT MODIFICATIONS

A. Contractor shall submit in writing any requests for modifications to the final drawings and specifications.

B. Documentation depicting modifications that are submitted to the Architect/Engineer for review shall indicate specific changes that are being suggested.

1.12 EXAMINATION OF SITE AND SPECIAL SITE CONDITIONS

A. Before submitting proposals for the work, the Contractor shall have examined the site and be satisfied with the existing conditions under which the work shall be accomplished.

B. No additional compensation shall be allowed the Contractor due to failure to make the above examination or neglect to include all materials and labor required to complete the work.

1.13 STORAGE OF EQUIPMENT AND MATERIALS

A. Materials shall be stored to insure the preservation of their quality and fitness for the project.

B. When considered necessary, the equipment and materials shall be placed on wooden platforms or other hard, clean surfaces, and not on the ground, and they shall be placed under cover.

C. Stored materials shall be located to facilitate prompt inspection.

D. Equipment and materials shall be stored in approved locations and in a manner to prevent overloading of the building structure.

1.14 CHASES AND RECESSES

A. Contractor shall provide chases and recesses required for the work of this Contract.

B. Coordinate the location of the chases and recesses with all other trades whose work is involved.

1.15 SLEEVES

A. Fire and/or Smoke Rated Walls: Where cables not in conduit penetrate rated walls, provide a UL listed assembly or method utilizing a sleeve. Sleeve shall be sized for 25% spare capacity. Refer to architectural drawings for location and rating of walls.

B. Non-Fire Rated Interior Walls: Sleeves through walls that extend from floor to structural ceiling provide a metal conduit sleeve extending a minimum of 2 inches beyond the wall.

The sleeve shall be fill voids with a sound-batt insulation.

C. Exterior Walls: Refer to section 26 05 31.

D. Floors

1. Where conduits penetrate rated floors, provide a UL listed assembly or method utilizing a sleeve. Sleeve shall extend a minimum of 4 inches above the floor. Refer to architectural drawings for rating of floors.

2. Where cables not in conduit penetrate rated floors, provide a UL listed assembly or method utilizing a sleeve. Sleeve shall extend a minimum of 4 inches above the floor. Sleeve shall be sized for 25% spare capacity. Refer to architectural drawings for rating of floors.

1.16 CUTTING AND PATCHING

A. All cutting and patching that is necessary for the installation of the work of this Contract shall be provided by this Contractor under the direction and to the satisfaction of the Architect/Engineer unless this work is specified to be the work of the Contractors of other Divisions.

B. No cutting of structural work shall be done without the written consent of the Architect/Engineer being previously obtained in each case, and all such work shall be done in accordance with the Owner's Representative's directions and supervision.

C. All patching shall match adjacent surfaces.

D. Contractor shall, before starting work in areas which requires significant cutting and patching, inspect and take note of existing conditions along with the Architect/Engineer to avoid later disputes with regard to the condition of the existing surface before work began.

1.17 WATERPROOFING

A. Where any work penetrates waterproofed surfaces including roofs, foundations, walls, etc., the Architect/Engineer shall approve the method of installation before the work is started.

B. Contractor shall furnish all necessary sleeves, caulking and flashing as required to make the installation of the work watertight.

1.18 COOPERATION WITH OTHER TRADES

A. Contractor shall give full cooperation to other trades and furnish any information necessary to permit the work of all trades to be installed satisfactorily and with least possible interference and/or delays.

B. If the Contractor installs work before coordinating it with other trades, or so as to cause interference with work of other trades, the Contractor shall make necessary changes in the work to correct the condition without extra charges.

1.19 JURISDICTION OF WORK

A. All work specified or shown for this Division of the work shall be part of this Contract.

- 1 B. The event of jurisdiction (as to whether the work shall be installed by another trade) shall
2 not release the work from this Contract.
- 3 C. In such occurrence, the original Contractor shall sublet the work to the trade having
4 jurisdiction.
- 5 D. The Contractor having jurisdiction shall then be responsible to complete the work in
6 accordance with these drawings and specifications and to the original Contractor of this
7 Division of the work.

8 1.20 SUPERVISION OF WORK

- 9 A. Contractor shall furnish the service of an experienced Superintendent who shall be
10 constantly in charge of the installation of the work together with all Contractors, skilled
11 workman, helpers and laborers required to unload, transfer, erect, install, connect, adjust,
12 start, operate and test each system.
- 13 B. The Superintendent shall be thoroughly acquainted with and be responsible for the various
14 Contractors' work so that it is properly coordinated and supervised to the satisfaction of the
15 Architect/Engineer.

16 1.21 DEFECTS

- 17 A. Should the Engineer find any portion of the electrical system installed under this Contract
18 that fails to comply with the Contract Documents, the Contractor shall replace the defects
19 or imperfections at the Contractor's expense. All other work disturbed by the correction of
20 defects or imperfections shall also be corrected at the Contractor's expense.

21 1.22 PROTECTION OF FINISHED WORK

- 22 A. Contractor shall maintain adequate protection of all contracted work and materials, located
23 either on or off of the site of the project. Contractor shall protect the work and materials of
24 all other Contractors and the Owner's property from damage arising from work under this
25 Contract.
- 26 B. All damages resulting from neglect or refusal of the Contractor to protect such work,
27 materials and property during erection, construction and completion of the project shall be
28 the responsibility of the Contractor.
- 29 C. All costs associated with the repair and/or replacement of the damaged work shall be borne
30 by the Contractor responsible for the damage. All repaired and/or replaced work shall be
31 completed to the satisfaction of the Architect/Engineer.

32 1.23 DAMAGE TO OTHER WORK

- 33 A. Contractor shall be held responsible for all damage to other work caused by the work or
34 through the neglect of the Contractor's employees.
- 35 B. The Electrical Contractor shall pay all costs for patching and repairing of damaged work
36 and the work shall be performed by the Contractor who installed the work.

1.24 USE OF SYSTEM

- A. The use or operation of new work, or any part thereof, even with the consent of the Owner's Representative, shall not be construed to be acceptance of the work, nor shall it be construed to obligate the Owner to accept improper work or defective material.

1.25 CLEANING PAINTING AND FINISHING

- A. During the progress of the work and when directed by the Architect/Engineer, the Contractor shall remove from the building site rubbish, dirt and other debris caused by performance of the work.
- B. The Contractor shall clean all exposed work, the interior and exterior of cabinets and pull boxes, etc., and remove all rubbish and debris resulting from the work.
- C. Where painted surfaces of equipment have been damaged or rusted during construction, the Contractor shall paint same to match final.

1.26 TESTS AND ACCEPTANCE

- A. The operation of the equipment and electrical systems does not constitute an acceptance of the work by the Owner. The final acceptance is to be made after the Contractor has adjusted his equipment and demonstrated that it fulfills the requirements of the drawings and the specifications.
- B. If any device, equipment or wiring fails the testing specified herein, that item(s) shall be replaced or repaired as directed by the Engineer.
- C. Upon completion of the installation, the Contractor shall furnish certificates of approval from all authorities having jurisdiction. He shall demonstrate that all work is complete and in perfect operating condition, with raceway and conduit system properly grounded, all wiring free from grounds, shorts, and that the entire installation is free from any physical defects. In the presence of the Engineer and the Owner, the Contractor shall demonstrate the proper operation of all miscellaneous systems.

1.27 RECORD DRAWINGS

- A. The Contractor shall keep a detailed up-to-date record of the following items:
 - 1. Feeder conduit routing.
 - 2. Dimensioned drawings indicating all conduits in the slab.
 - 3. Approximate junction box and branch conduit locations.
 - 4. Actual circuit numbers, the equipment and devices are connected to.
- B. Record drawings shall be maintained throughout the duration of the project and shall reflect all pertinent information. At the time of project completion, the EC shall provide a bond copy and CD ROM copy of the following to the Owner's representative and engineer:
 - 1. A complete set of original contractor field mark up record drawings in color

scanned PDF format, and bond copy prints.

2. A complete set of contractor edited, AutoCAD generated, bond copy prints.

3. AutoCAD files associated with the record drawings.

C. See General Requirements - Division 1, for additional information concerning record documents.

1.28 ELECTRICAL DOCUMENTATION AVAILABILITY

A. The Project Electrical Contractor may obtain E-mail copy, which contain the CAD, generated electrical drawings from the Engineer. The architectural background drawings must be obtained from the Architect.

B. The cost will be \$250.00 per or email, which includes handling and shipping.

1.29 TEMPORARY ELECTRICAL SERVICE

A. Refer to General Requirements and Division 1.

B. Temporary power service shall be from a separate utility service.

1.30 GUARANTEES AND WARRANTIES

A. Contractor shall guarantee, in writing, that:

1. All work installed shall be free from any and all defects in workmanship and materials.

2. All apparatus shall develop capacities and characteristics specified.

3. During the period of one year, or as otherwise specified, from date of substantial completion, any defects in workmanship, material or performance appear, the Contractor shall, without cost to the Owner, remedy such defects within a reasonable time as specified in notice from the Owner's Representative.

B. Refer to General Requirements and Division 01.

C. In default thereof, the Owner's Representative shall have the work done and charge the cost of the work to the Contractor.

D. Contractor shall guarantee that items furnished shall have capacities equal to, or greater than, those specified.

E. Furnish manufacturer's written warranties for all equipment, stating effective date of Warranty to the Owner's Representative.

1.31 WORK BY OWNER

NOT APPLICABLE.

1.32 OWNER FURNISHED PRODUCTS

- A. The Electrical Contractor shall install and wire Owner furnished products as listed below. The Electrical Contractor shall also include receiving the products at the job site and moving the products to their final location. The Electrical Contractor shall handle the repair or replacement, with the assistance of the Owner, of any products that are damaged or defective upon receipt. The Electrical Contractor shall assume all warranty responsibilities for these Owner furnished products.

1.33 ALLOWANCES

- A. See General Requirements or Division 01 for allowance information.

1.34 UNIT PRICES

- A. See Division 01 or bidding requirements for unit pricing information.

1.35 ALTERNATES

- A. See Division 01 or bidding requirements for applicable alternate bidding information.

PART 2 PRODUCTS

2.1 ACCESS PANELS

- B. Size: adequate size to permit adjustment or service of concealed devices.

- C. Design:

1. Suitable for installation in the material forming the finished surface.

2. Flush metal frame.

3. Flush hinged steel door with flush latch.

4. Latches:

a. Screwdriver operated.

b. Key operated cylinder lock.

c. Non-key special tamperproof design.

- D. UL listed to conform to the fire rating of the surface it is installed in.

- E. Panels in acoustic ceiling shall be recessed type, to which tile can be attached flush with the ceiling tile.

2.2 FIRESTOP MATERIALS

- B. One-part, intumescent elastomer, UL classified, non-corrosive to metal, and compatible with synthetic cable jackets.
- C. Material shall expand up to 10 times when exposed to flame or heat.
- D. Maximum flame spread and fuel contributed of 25 and smoke development of 50 when tested in accordance with ASTM E84.

PART 3 EXECUTION

3.1 ACCESS PANELS

- A. Provide access panels for access to equipment, junction and/or pull boxes or other specialties installed behind wall or above ceiling surfaces.
- B. Lay-in tee bar ceilings and snap-in removable metal pan ceilings shall be considered adequate for access.
- C. Sublet installation work to subcontractors specifically skilled in the construction of the surfaces involved.
- D. Confer with the other Project Contractors with respect to access panel locations and wherever practicable, group devices in such a manner so as to eliminate as many panels as possible.
- E. Remove all markings and labels from access panels.
- F. Provide screwdriver operated latches for all access panels except the following specific exclusions:
 - 1. Public or Secure Areas shall be key operated.
 - 2. Hourly Rated Surfaces shall be as required by UL.

3.2 FIRESTOP MATERIALS

- A. Penetrations through fire and/or smoke rated construction shall be sealed to maintain the rating of the construction in which they occur.
- B. Utilize firestop materials types as scheduled below. All installations shall be UL listed for the rating of the barrier penetrated and the construction type utilized in that barrier.
 - 1. Conduit through-penetration of rated walls: Putty.
 - 2. Conduit through-penetration of rated floors: Putty or mortar.
 - 3. Cable tray through-penetration of rated walls: Bags or pillows.
 - 4. Cable through-penetration of rated floors or walls: Putty.

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- 1 5. Junction box membrane-penetration of rated walls: Putty pads.
- 2 C. Comply with the manufacturer's requirements for proper installation of firestop materials
- 3 to obtain the required fire and/or smoke rating.

END OF SECTION

SECTION 26 05 02

MINOR ELECTRICAL DEMOLITION FOR REMODELING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electrical demolition.

1.2 PURPOSE OF ELECTRICAL DEMOLITION DRAWINGS

- A. The purpose of the electrical demolition drawings is to provide the general scope of the electrical demolition required for the project. The electrical demolition drawings may not indicate every lighting fixture, wiring device, panelboard, junction box and etc.
- B. The contractor shall include all costs associated with the removal and/or relocation of any electrical item, even if not indicated on the electrical demolition drawings, to facilitate the proposed construction.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment for patching and extending work: As specified in individual Sections.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify field measurements and circuiting arrangements are as shown on Drawings.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition Drawings are based on the best available information at the time of design. Report discrepancies to Architect/Engineer before disturbing existing installation.
- D. All materials identified to be salvaged or reused shall be inspected by the Contractor prior to removal. The Contractor shall provide a list of damaged equipment to the Architect/Engineer.
- E. Beginning of demolition means contractor accepts existing conditions.

3.2 PREPARATION

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.
- B. Coordinate utility service outages with 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

1 personnel experienced in such operations.

2 D. After completion of demolition, provide permanent wiring and connections to maintain
3 existing systems in service.

4 E. Existing Electrical Service: Maintain existing system in service until new system is
5 complete and ready for service. Disable system only to make switchovers and connections.
6 Obtain permission from Owner at least 5 working days before partially or completely
7 disabling system. Minimize outage duration.

8 3.3 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK

9 A. Demolish and extend existing electrical work under provisions of Section 26 05 00 and this
10 Section.

11 B. Remove, relocate, and extend existing installations to accommodate new construction.

12 C. Remove abandoned wiring to source of supply.

13 D. Remove exposed abandoned conduit, including abandoned conduit above accessible
14 ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.

15 E. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit
16 servicing them is abandoned and removed. Provide blank cover for abandoned outlets
17 which are not removed.

18 F. Disconnect and remove abandoned panelboards and distribution equipment.

19 G. Disconnect and remove electrical devices and equipment serving utilization equipment that
20 has been removed.

21 H. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other
22 accessories.

23 I. Repair adjacent construction and finishes which were damaged during demolition and
24 extension work to match existing conditions.

25 J. Maintain access to existing electrical installations which remain active. Modify installation
26 or provide access panel as appropriate.

27 K. Existing electrical equipment, devices, raceways, etc. which are required to remain but are
28 affected because of the proposed renovation shall be revised/relocated to accommodate the
29 new construction.

30 L. Extend existing installations using materials and methods as specified.

31 M. Where conduits penetrate below grade walls, they shall be removed as far as possible,
32 sealed and/or capped to maintain the water integrity of the building envelope.

33 N. Existing branch conduits may be reused under the following conditions: The conduit meets
34 all current codes regarding wire fill, supporting means etc.

O. In renovated areas where existing ceilings are being removed and a new ceilings are being installed, the electrical contractor shall be responsible for resupporting all existing conduits, boxes, etc. required to remain, per the these specifications and all applicable codes.

P. In renovated areas where new non-accessible ceilings are being installed, the contractor shall have the option of removing or relocating existing junction boxes, conduit and conductors that will be inaccessible or providing access panels for the existing junction boxes.

3.4 SALVAGEABLE EQUIPMENT

A. The Contractor shall dispose of all material.

3.5 BALLAST DISPOSAL

A. The Contractor shall inspect all ballasts in all light fixtures removed as part of this project and take the actions described below.

B. All ballasts labeled as "NON-PCBs" or "NO PCBs" shall be handled as described in this section. 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 have the wires clipped off and the ballasts placed in governmental approved enclosures (drums) and placed in storage in a location within the building as directed by the Owner. The quantity and size of the enclosures (drums) shall be determined by the Contractor. Enclosures (drums) will be provided by the owner. The Contractor shall provide the Owner in written form, a total count of the PCB ballasts.

D. The ballasts are not to be removed from the work site by the Contractor. To do so, would be a violation of governmental hazardous waste regulations.

E. The Contractor shall label and mark the PCB storage enclosures with approved PCB labels and the storage area with signs, marks and lines to meet the regulations of the governing authorities.

F. The Contractor shall also provide approve PCB absorbent materials to be stored immediately adjacent to the drum storage area. Do not place loose absorbent material in the drum.

G. When the ballast demolition is completed and all the PCB ballasts are placed in drums ready to be picked up for disposal, the Contractor shall notify the Owner. The Owner shall make arrangements for pickup and disposal of the PCB ballasts, including the cost of disposal.

3.6 LAMP DISPOSAL

A. The Contractor shall remove all lamps from all luminaires being removed or relocated. The lamps shall be removed intact. The Contractor shall be responsible for any additional charges for broken lamps.

1 B. The Contractor shall store the lamps in drums or boxes and place in storage in a location
2 within the building as directed by the Owner. The Contractor shall provide the containers.
3 The lamps shall be sorted by type.

4 1. Fluorescent

- 5 a. Compact, PL or biax lamps
- 6 b. U shaped lamps
- 7 c. Circline lamp
- 8 d. 2', 3', 4' and 8' straight lamps.

9 2. Mercury Vapor

10 3. High Pressure Sodium

11 4. Low Pressure Sodium

12 5. Metal Halide

13 6. Incandescent

14 C. Broken lamps shall be stored in a heavy plastic bag and the bag put into a rigid container.
15 The broken lamps shall be sorted as described above.

16 D. The Contractor shall provide to the Owner, in written form, a total count of all lamp types,
17 including broken lamps.

18 E. These lamps are not to be removed from the site by the Contractor. To do so, would be a
19 violation of governmental hazardous waste regulations.

20 F. When the lamp demolition is complete and all lamps are placed in the containers ready to
21 be picked up for disposal, the Contractor shall notify the Owner. The Owner shall make
22 arrangements for pickup and disposal of the lamps, including the cost of disposal.

23 3.7 HAZARDOUS SUBSTANCES

24 A. Ionization smoke detectors: The contractor shall include all the costs associated with
25 disposal of the non-salvaged ionization smoke detectors. Typically, the detectors can be
26 returned to their original manufacturer for disposal of the radioactive element.

27 B. Self-luminous exit lights: The contractor shall include all the costs associated with disposal
28 of the non-salvaged self-luminous. Typically, the exit signs can be returned to their original
29 manufacturer for disposal of the radioactive element.

30 1. PCB-Liquid filled transformers.

31 2. PCB-Ballasts.

32 3. Lamps with mercury.

33 4. Asbestos insulated wire.

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5. Oil immersed equipment.

6. Other.

3.8 CLEANING AND REPAIR

A. 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.

3.9 INSTALLATION

A. Install relocated materials and equipment under the provisions of the associated specification section(s) for new equipment as if the relocated equipment is new equipment. Example: Relocated luminaries shall be installed per specification section 26 50 00.

END OF SECTION

SECTION 26 05 03

ELECTRICAL EQUIPMENT MOUNTING REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electrical equipment mounting height requirements applicable to all Division 26 sections.

1.2 REFERENCES

- A. NECA - Standard of Installation.
- B. NFPA - National Fire Protection Association.
- C. ADA - American with Disabilities Act.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 GENERAL

- A. The mounting heights described below are the standard mounting heights. All mounting heights indicated on the drawings shall supersede the mounting heights described herein for that item only.
- B. All mounting heights are to the centerline of the item unless noted otherwise.
- C. All equipment installed in this project shall be mounted per the American Disabilities Act (ADA) requirements.

3.2 MOUNTING HEIGHTS

A. Wiring Devices

- 1. Switches and Switch/Receptacle Combinations: 46 inches above finished floor.

- 2. Receptacles:

- a. Standard: 18 inches above finished floor, unless specifically noted otherwise on floor plans.
- b. Above countertops: Vertically mounted, 6 inches above backsplash.

B. Telecommunication Outlets

- 1. Standard: 18 inches above finished floor.
- 2. Above countertops: 6 inches above backsplash.

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- 1 3. Wall mount: 54 inches above finished floor.
- 2 C. Low Voltage Switching Equipment
- 3 1. Switches: 46 inches above finished floor.
- 4 2. Relay panels: 72 inches above finished floor to top of enclosure.
- 5 D. Disconnect Switches
- 6 1. Disconnect switches: 72 inches above finished floor to top of enclosure.
- 7 E. Panelboards
- 8 1. Panelboards: 72 inches above finished floor to top of enclosure; install panelboards
- 9 taller than 72 inches with bottom of the enclosure, 4 inches above floor.
- 10 F. Motor Controllers
- 11 1. Motor controllers: 60 inches above finished floor to top of enclosure.
- 12 G. Time Clocks
- 13 1. Time clocks: 60 inches above finished floor to top of enclosure.
- 14 H. Transfer Switches
- 15 1. Transfer Switches: 72 inches above finished floor to top of enclosure; transfer
- 16 switches taller than 72 inches shall be floor mounted.
- 17 I. Interior Luminaires
- 18 1. Fixtures to be mounted at 80" minimum above finished floor to bottom of fixture:
- 19 a. Wall mounted luminaires protruding greater than 4" from wall.
- 20 b. Pendant mounted fixtures located above walkways.
- 21 2. See electrical and architectural drawings for additional information further
- 22 defining mounting height requirements.
- 23 J. Public Address System
- 24 1. Volume controls: 46 inches above finished floor.
- 25 2. Wall mounted speakers: 16 inches below finished ceiling.
- 26 3. Microphone jacks: 18 inches above finished floor
- 27 K. Security Systems
- 28 1. Card Readers and key pads: 46 inches above finished floor.

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- 1
2. Control panels: 72 inches above finished floor to top of enclosure.
- 2

END OF SECTION

SECTION 26 05 21

BUILDING WIRE AND CABLE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Building wire and cable.
- B. Wiring connectors and connections.

1.2 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. NECA (National Electrical Contractors Association) "Standard of Installation".

1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.4 FIELD SAMPLES

- A. Provide samples at the request of the Engineer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

Not used

2.2 BUILDING WIRE AND CABLE

- A. Description: Single conductor insulated wire.
- B. Conductors:
 - 1. Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation
 - 1. Interior or Exterior Above Grade: ANSI/NFPA 70; Type THHN/THWN insulation.
 - 2. Exterior Below Grade: ANSI/NFPA 70; XLP Type XHHW-2 insulation.

3. Fire Rated: ANSI/NFPA 70; Type RHH insulation for fire resistant wiring. Comply with UL Standard 2196, UL Subject #44 and UL Electrical Circuit Protective System (FHIT) #25 of the UL Fire Resistance Directory.

- E. Color coding: Insulation for all conductor sizes shall be colored. Color coding as specified in 26 05 53

2.3 COMMUNICATIONS CABLES

- A. Communications cables shall be the type as called for in the specifications and drawings for the installation of various communications systems.

- B. Communications cables installed in cable trays shall be approved for use in cable tray and shall be of fire resistive construction.

- C. Cables routed exposed through return air ceiling plenums shall be smoke resistance Teflon coated cable classified as type CLP or CMP communications cable.

2.4 WIRING CONNECTORS

- A. Conductors #10 AWG and smaller: 3M Scotch-Lok compression type soft throat solderless connectors with plastic cover.

- B. Splices and taps in conductors #8 AWG and larger: Solderless compression type connectors, tool and die applied, of a type that not loosen under vibration or normal strains. Burndy "Hy-Dent" type or equivalent.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.

3.2 PREPARATION

- A. Completely and thoroughly swab raceway before installing wire.

3.3 INSTALLATION

- A. General Installation

1. Install products in accordance with manufacturer's instructions and NECA "Standard of Installation".
2. Use solid conductor for feeders and branch circuits 10 AWG and smaller. Stranded conductors may be utilized for branch circuits if solid conductors are terminated to the wiring devices.
3. Use stranded conductors for control circuits and for wiring served by isolated power systems.

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4. Use conductor not smaller than 12 AWG for power and lighting circuits.
5. Use conductor not smaller than 16 AWG for control circuits.
6. Voltage drop for branch circuits and feeder circuit combined shall not exceed the requirements of NEC Article 215.
7. Install conductors only when raceway system is complete and building is enclosed and watertight. Pull all conductors into raceway at same time.
8. Route a continuous insulated equipment grounding conductor with all feeder and branch circuits.
9. Route branch circuits and switch legs as dictated by construction, these specifications, or instructions from the Engineer.
10. Use suitable wire pulling lubricant for building wire.
11. Protect exposed cable from damage.
12. Use suitable cable fittings and connectors.
13. Neatly train and lace wiring inside boxes, equipment, and panelboards.
14. Clean conductor surfaces before installing lugs and connectors.
15. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
16. Circuit numbers shown on the drawings are for the Contractor's estimating purposes and to plan his wiring. Exact circuit numbers shall be selected by the Contractor at his option to provide a balanced load on all phases at panelboards. Panelboard average load shall not differ from phase to phase by $\pm 7\frac{1}{2}\%$
17. Cables within switchgear shall be routed in a manner which will allow adequate room for bending and terminating cables. Cables must be secured in a manner which will not result in cable weight being placed on the termination electrical joint. Cable support shall be made in a manner that does not force cable against ground metal or which compresses cable diameter.
18. Use suitable reducing connectors or mechanical connector adapters for connecting existing aluminum conductors to copper conductors.

C. Feeder Installation

1. Feeder conduits shall not be installed in poured in place concrete.
2. Feeders shall follow the most accessible routes, concealed in construction in finished areas, exposed to the minimum temperature gradient and to minimum temperature fluctuation. Confine feeders to insulated portions of the building, unless otherwise shown.

3. Parallel Feeders

- a. Where multiple raceways are used for a single feeder, each raceway shall contain a conductor of each phase and neutral if used, and grounding conductor, if specified.
- b. Where feeder conductors are run in parallel, conductors shall be of same length, same material, circular-mil area, insulation type, and terminated in same manner.
- c. Where parallel feeder conductors are run in separate raceways, raceways shall have same physical characteristics.

4. Each raceway shall contain only those conductors comprising a single feeder circuit.

3.4 INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable under provisions of Section 26 05 53.
- B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.5 FIELD QUALITY CONTROL

- A. Inspect wire for physical damage and proper connection.
- B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- C. Verify continuity of each branch circuit conductor.

END OF SECTION

SECTION 26 05 25

POWER CABLE ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Armored cable.

1.2 REFERENCES

A. General

1. NFPA 70 - National Electrical Code.

2. Underwriters Laboratories.

3. NETA-ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).

B. Armored Cable

1. Federal Specification J-C-30B.

2. National Electrical Code – Article 333.

3. Underwriters Laboratories Standard 4.

1.3 SYSTEM DESCRIPTION

A. General

1. All wiring shall be in accordance with the latest edition of the National Electrical Code (NEC) and/or the authority having jurisdiction and the manufacturer's recommendations.

1.4 SUBMITTALS

A. Submit under provisions of Section 26 05 00.

B. Product Data: Provide electrical characteristics and connection requirements.

C. Test Reports: Indicate satisfactory completion of required tests and inspections.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of products.

1.5 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 26 05 00.

1.6 OPERATION AND MAINTENANCE DATA

- A. Submit under provisions of Section 26 05 00.
- B. Operation Data: Operating instructions.
- C. Maintenance Data: Maintenance and repair procedures.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by UL and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and indicated.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not install products until building is enclosed.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Verify that field measurements are as shown on Drawings and/or are as instructed by the manufacturer.
- C. Verify that required utilities are available, in proper location, and ready for use.
- D. Beginning of installation means installer accepts conditions.

3.3 INSTALLATION

- A. General

- 1. Install products in accordance with manufacturer's instructions.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 26 05 00.
- B. Replace equipment, components, and wiring which is proved to be defective.
- C. System shall test free from grounds, shorts and open circuits.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Grounding Electrode.
- B. Grounding Electrode Conductors.
- C. Grounding Bus Bars.
- D. Equipment Grounding Conductors.
- E. Neutral Grounding.
- F. Metal Light Pole Grounding System.

1.2 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.3 GROUNDING ELECTRODE SYSTEM

- A. Metal underground water pipe.
- B. Metal frame of the building.
- C. Rod electrode.

1.4 PERFORMANCE REQUIREMENTS

- A. Grounding Electrode System Resistance: 5 ohms.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 GROUNDING ELECTRODES

See design drawings.

2.2 GROUNDING CONDUCTORS

See design drawings.

2.4 CONNECTIONS

A. Mechanical connectors

1. Ground clamp fittings shall be interlocking clamp type fabricated from high strength corrosion-resistant metal with high strength silicon bronze U-bolt, nuts, and lock washers.

B. Cable terminations. Either thermoweld or permanent crimp-style are acceptable.

1. Exothermic connections shall be Cadweld or equivalent.
2. Permanent crimp-style shall be Greenlee die or die-less or equivalent.

PART 3 EXECUTION

3.1 GENERAL

A. Install Products in accordance with manufacturer's instructions.

B. Ground connection surfaces shall be cleaned and all connections shall be made so that it is impossible to move them.

C. Attach grounds permanently before permanent building service is energized.

3.2 GROUNDING ELECTRODE

A. Verify that final backfill and compaction has been completed before driving rod electrodes

B. Install rod electrodes at locations indicated. Install additional rod electrodes as required to achieve specified resistance to ground. Drive ground rod to a depth of 4 inches below finished grade.

C. Water piping system ground shall be augmented by 2 NEC approved grounding electrodes so as to achieve an effective ground resistance as required by code and as shown on the plans. Building steel shall be used where available.

3.3 GROUNDING ELECTRODE CONDUCTORS

A. Attach Grounding Electrode Conductor to point ahead of water meter or service shut-off valve.

1. Install bonding jumper around water meter.
2. Install in rigid metal conduit securely fastened to pipe.
3. Attach non-ferrous metal tag to warn against removal.

4. Bond metallic conduits, supports, cabinets, and other equipment so ground will be electrically continuous from service to outlet boxes.

5. Grounding Electrode Conductor shall be permitted to be attached to other Grounding Electrodes where available in the building as defined in NEC Article 250 in lieu of attaching to water service.

B. The Grounding Electrode Conductor shall be installed continuous and without splice from nearest building Grounding Electrode to service equipment.

C. Connections shall be accessible for inspection and checking. No insulation shall be installed over Grounding Electrode Conductor connections.

D. Install Grounding Electrode Conductors to permit shortest and most direct path from equipment to ground. When conductor runs through metallic conduit, bond to conduit at entrance and exit with a bolted clamp.

3.4 EQUIPMENT GROUNDING CONDUCTORS

A. Install Equipment Grounding Conductor within each feeder and branch circuit raceway. Conductor shall be bonded at each end on suitable lug, bus, or bushing.

B. Install Equipment Grounding Conductor in nonmetallic and flexible conduit to complete equipment ground continuity. Ground wire shall be bonded at equipment and at first junction box of conduit system on line side of flexible conduit to the system.

C. The Equipment Grounding Conductors shall be a separate, insulated green conductor. Isolated Equipment Grounding Conductors used in this facility shall be designated by any code approved color and this color shall be consistent throughout.

D. All circuits serving isolated ground receptacles shall be served from a dedicated isolated ground conductor. This conductor is in addition to the green Equipment Grounding Conductor indicated above.

E. Provide grounding in patient care areas to meet requirements of NFPA 99 and ANSI/NFPA 70.

3.5 NEUTRAL GROUNDING

A. Ground neutral at service or at separately derived sources only. This ground conductor shall be bonded to the Grounding Electrode Conductor.

3.6 METAL LIGHT POLE GROUNDING SYSTEM

A. All circuits serving a metal light pole installation shall be provided with an equipment grounding conductor sized in accordance with NEC Section 250.

B. EC shall ground each metal lighting pole to the provided equipment grounding conductor.

C. If the provided pole does is not equipped with an accessible grounding lug near the hand hole at the base of the pole, install a ground lug on wall of pole directly across from hand hole.

D. See pole base detail(s) on the construction documents for additional information.

3.7 INTERFACE WITH OTHER PRODUCTS

A. Interface with site grounding system installed under Section 33 79 00.

B. Interface with lightning protection system installed under Section 26 41 13.

3.8 FIELD QUALITY CONTROL

A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.

B. Use suitable test instrument to measure resistance to ground of system. Perform testing in accordance with test instrument manufacturer's recommendations using the fall-of-potential method.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

1.2 REFERENCES

- A. NECA - National Contractors Association.
- B. NEMA - National Electrical Manufacturers Association.
- C. ANSI - American National Standards Institute.
- D. ANSI/NFPA 70 - National Electrical Code.

1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

NOT USED

2.2 GENERAL

- A. Metal supporting devices shall be zinc galvanized or cadmium plated steel or malleable iron.

2.3 LIGHTING FIXTURE SUPPORT

- A. Items such as stems, hickies, bar hangers, and clips required to securely attach fixtures to ceilings or walls.
- B. Studs and unistrut support for fixture outlet and ceiling support.
- C. Fixture grid hangers for mounting surface fluorescent units to exposed grid ceiling.
- D. Drilled expansion insert type anchors suitable for load and application requirements such as sleeve anchors, lag shields, and plastic anchors.

- E. Provide auxiliary supports so that fixtures can be drawn up tightly, cannot be tilted or rotated, and will not be affected by vibrations.

2.4 MOUNTING PANELS

- A. Size mounting panels to mount necessary equipment, of 3/4 inch exterior grade plywood as specified on drawings.

- B. Provide uniform mounting panels as far as practical. Preferred sizes being 12 in. X 18 in., 18 in. X 24 in., 18 in. X 30 in., and 24 in. X 30 in.

2.5 CONDUIT SUPPORTS

- A. One hole straps for conduits 1" and smaller. Two hole straps for conduits larger than 1". Galvanized steel straps for metal conduits and plastic straps for nonmetallic conduits.

- B. Continuous slot or T-slot galvanized steel concrete insert channel.

2.6 TRANSFORMER MOUNTING BRACKETS

- A. Provide mounting brackets fabricated of welded galvanized steel channel section.

- B. Design bracket to support the size transformer as indicated on drawings.

PART 3 EXECUTION

3.1 GENERAL

- A. Install products in accordance with manufacturer's instructions.

- B. Provide anchors, fasteners, and supports in accordance with NECA "Standard of Installation".

- C. Do not fasten supports to pipes, ducts, mechanical equipment, and conduit.

- D. Do not use spring steel clips and clamps.

- E. Do not use powder-actuated anchors without approval from the Architect/Engineer.

- F. Do not drill or cut structural members without approval from the Architect/Engineer.

3.2 PREPARATION

- A. Install hangers, supports, and anchors only after structural work, where work is to be installed, has been completed. Correct inadequacies such as proper placement of inserts, anchors, and other building structural attachments.

- B. Examine areas and conditions under which equipment and associated components are to be installed and notify Architect, in writing, of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected.

- C. Determine that ceiling channel system is adequately supported to receive and support lighting fixtures. Where deemed inadequate, do not install fixtures until additional support is provided.

3.3 LIGHTING FIXTURES

- A. Install channel supports across main grid runners or grid supports, securely tied down or anchored for fixtures and devices mounted in suspended ceiling systems so as not to cause tile to sag and so that fixture or device cannot be lifted, rotated, or displaced. Provide additional support of ceiling grid or tees at those locations where tiles and ceiling grid sags.

- B. Install grid troffer support clips in accordance with NEC 410.

3.4 INSTALLATION OF BUILDING ATTACHMENTS

- A. Install building attachments at required locations within concrete or on to structural steel or raceway and equipment support.

- B. Install additional building attachments where support is required for additional concentrated loads.

- C. Install concrete inserts before concrete is placed.

3.5 INSTALLATION OF ANCHORS

- A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ANSI B31 and to prevent the transfer of loading and stresses to connected equipment.

- B. Installation methods shall be in conformity with the manufacturer's recommendations for maximum holding power, but in no case shall the depth of hole be less than four bolt diameters. Minimum distance between the center of any expansion anchor and an edge of exterior corner of concrete shall be not less than 42 times the diameter of the hole in which it is installed.

3.6 SUPPORT OF CONDUIT

- A. Fasten conduit to structural parts of building in a manner acceptable to Engineer.

- B. Do not use perforated hanger iron.

- C. Install concrete insert channel as required, with spacings as recommended by manufacturer. Install with anchor and caps, insert joiner clips and closer seals as required.

- D. Support conduit as follows:

1. Single conduit runs:

- a. Vertical Surfaces: Galvanized, heavy duty, sheet steel straps; back straps to be provided for all exposed conduit and conduit on exterior walls.
- b. Horizontal Surfaces: Galvanized, heavy duty, 2-hole steel pipe straps.

2. Multiple conduit runs:

- a. Vertical Surfaces: Horizontal or vertical rack channel with conduit straps as required.
- b. Horizontal Surfaces: Single or double rack channel trapeze, complete with conduit straps as required; all supported with threaded hanger rods.

E. Roof penetrations:

1. 13 in. and larger conduit runs passing through floors shall be supported at each floor with riser pipe clamps.
2. Conduit extending through roof shall pass through a ceiling box at roof lines.
3. Provide 14 ga. minimum copper box complete with watertight soldered seams and flanged to serve as pitch pocket for each conduit.
4. Conduit and pitch pocket shall be installed in advance of roofing work.

3.7 VERTICAL CABLE SUPPORT

- A. Conductors in vertical raceways shall be supported using suitable cable supports. Locate supports every 40 ft-0 in. length of conductor in a vertical raceway or as required by Code.

3.8 TRANSFORMER SUPPORTS

- A. Install auxiliary transformer wall mounting brackets where wall mounted transformers are indicated on drawings.

3.9 EQUIPMENT ENCLOSURES

- A. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- B. In wet and damp locations use steel channel supports to stand cabinets and panelboards one inch (25 mm) off wall.
- C. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

END OF SECTION

SECTION 26 05 31

CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal conduit.
- B. PVC coated metal conduit.
- C. Flexible metal conduit.
- D. Liquid tight flexible metal conduit.
- E. Electrical metallic tubing.
- F. Non-metallic conduit.
- G. Specialty fittings
- H. Roof Pipe Curbs.

1.2 REFERENCES

- A. Underwriter's Laboratories, Inc. (UL) Electrical Construction Materials Directory.
- B. ANSI/NFPA 70 - National Electrical Code.
- C. NECA "Standard of Installation".
- D. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- E. ANSI C80.6 - Intermediate Metal Conduit.
- F. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
- G. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- H. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers and Box Supports.
- I. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
- J. ANSI C80.5 - Rigid Aluminum Conduit.
- K. NEMA TC13 - Electrical Nonmetallic Tubing.
- L. NEMA TC3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

M. NEMA 0S2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.

1.3 PROJECT RECORD DOCUMENTS

A. Accurately record actual routing of all feeder conduits.

B. Locations of all in slab and under slab conduits shall be dimensioned to the building structure. Indicate material type for each conduit.

1.4 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firms acceptable to the authority having jurisdiction, as suitable for purpose specified and shown.

1.5 PROJECT CONDITIONS

A. Verify routing and termination locations of conduit prior to rough-in.

B. Any conduit routings shown on Drawings are approximate locations unless dimensioned. Route as required to complete wiring system.

PART 2 PRODUCTS

2.1 GENERAL

A. The products listed under Part 2 - Products are intended as conduit type definitions only. All allowable installation methods and required conduit types for those installations are defined under Part 3 - Execution. All conduit types listed under this section may not be approved for use on this project.

2.2 METAL CONDUIT

A. Rigid Steel Conduit: ANSI C80.1.

B. Intermediate Metal Conduit (IMC): Rigid steel ANSI C80.6.

C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; material to match conduit. Fittings shall be liquid tight, threaded with insulated throat and plastic bushing.

2.3 PVC COATED METAL CONDUIT

A. Description: NEMA RN 1: Rigid steel conduit with external PVC coating, 40 mil thick.

B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel fittings with external PVC coating to match conduit. Fittings shall be the same as metal conduit. PVC gasketing for mating surfaces.

2.4 FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction.

B. Fittings: ANSI/NEMA FB 1. Fittings shall be malleable steel construction, grounding type, two screw clamp type with locknuts and plastic bushing.

2.5 LIQUID TIGHT FLEXIBLE METAL CONDUIT

A. Description: Interlocked steel construction with PVC jacket.

B. Fittings: ANSI/NEMA FB 1. Fittings shall be malleable steel construction with non-metallic covering, tapered threaded hub, grounding type, liquid tight with plastic bushing.

2.6 ELECTRICAL METALLIC TUBING (EMT)

A. Description: ANSI C80.3; galvanized tubing.

B. Fittings and Conduit Bodies: ANSI/NEMA FB1. Fittings shall be steel set screw type (indenter type are not acceptable) concrete tight with insulated throat or plastic bushing.

2.7 NONMETALLIC CONDUIT

A. Description: NEMA TC 2; Schedule 40 PVC.

B. Fittings and Conduit Bodies: NEMA TC 3, material to match conduit.

2.8 SPECIALTY FITTINGS

A. Expansion fittings shall be equivalent to Crouse-Hinds type XJG with copper bonding jumper.

B. Expansion/deflection fittings shall be equivalent to Crouse-Hinds type XD with copper bonding jumper.

C. Plastic Bushings:

1. For conduit terminations, bushings shall be equivalent to Thomas & Betts 200 Series.

2. For conduit stubs, bushings shall be equivalent to Arlington Industries EMT50 or EMT 75.

D. Bonding and Grounding Bushings shall be equivalent to Thomas & Betts, 3000 Series.

E. Riser Fittings: Vertical cable supports shall be equivalent to O.Z. Gedney Type R and/or DR. and shall be located accessible and removable in junction boxes.

2.9 ROOF PIPE CURBS

A. Manufacturers:

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1. Custom Curb.
 2. Pate.
 3. Roof Products and Systems.
 4. ThyCurb.
 5. Vent Products.
 - B. Curb Construction:
 1. Continuously welded, 18 gauge, galvanized steel shell.
 2. Integral base plate.
 3. 3 lb. density, 1-1/2" thick rigid insulation.
 4. 2" x 2" treated wood nailer.
 5. Compensate for roof pitch for level installation.
 - C. Minimum height above deck, 12".
 - D. Cover: Acrylic clad thermoplastic cover, galvanized fastening screws, graduated step boots with stainless steel clamps.
- PART 3 EXECUTION
- 3.1 GENERAL - ALL INSTALLATIONS
- A. Provide a separate raceway system for each of the following:
 1. Normal power wiring.
 2. Emergency power wiring.
 - B. Minimum size conduit as outlined below:
 1. 3/4 inch.
 2. Minimum conduit size for exterior underground conduits, shall be 1" minimum unless noted otherwise.
 - C. Install conduit in accordance with NECA "Standard of Installation."
 - D. The conduit installation shall be complete prior to installing conductors and cables.
 - E. Cut conduit square using saw or pipecutter; de-burr cut ends.
 - F. Bring conduit to shoulder of fittings; fasten securely.

- G. Install no more than the equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams.
- H. Provide suitable fittings to accommodate expansion and deflection where conduit crosses control and expansion joints.
- I. Provide #12 pull wire in each empty conduit except sleeves and nipples.
- J. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- K. Ground and bond conduit under provisions of Section 26 05 26.
- L. Identify conduit under provisions of Section 26 05 53.

3.2 INDOOR INSTALLATIONS

- A. Conduits shall be electrical metallic tubing.
- B. All conduits shall be concealed in finished spaces.
- C. Install conduits above suspended ceiling so that they do not interfere with the removal of the ceiling tile.
- D. Conduits may be routed exposed in unfinished areas such as mechanical rooms.
- E. Conduits shall be installed within the building envelope, in insulated portions of the building and follow the most accessible routes.
 - 1. Exception: Conduits installed within and below floor slabs. See the Additional Requirements for Specific Installations section for allowable installations.
- F. Conduits shall be concealed in finished areas, and exposed to minimum temperature gradient or fluctuation.
- G. Arrange supports to prevent misalignment during wiring installation.
- H. Secure conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers, minimum spacing per code.
- I. Group related conduits; support using conduit rack. Construct rack using steel channel.
- J. Secure conduit supports to building structure and surfaces under provisions of Section 26 05 29.
- K. Do not support or fasten conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- L. Do not attach conduit to ceiling support wires.
- M. Arrange conduit to maintain headroom and present neat appearance.
- N. Route conduit parallel and perpendicular to walls.

- O. Maintain adequate clearance between conduit and piping. Route conduit above water, fluid or steam piping wherever possible.
- P. Maintain 12 inches (300 mm) of clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C). Do not route conduit over boiler, incinerator, or other high temperature equipment.
- Q. Final connections to transformers, motors, generators, and other vibration producing equipment shall be made with appropriately sized flexible conduit. Length of flexible conduit connection shall be kept to a minimum. 40

3.3 OUTDOOR INSTALLATIONS

A. General

- 1. Trapped conduit runs without facilities for continuous drainage are not acceptable. Provide junction box with drain fitting at low points in conduit system.
- 2. No conduits shall be visible from the exterior of the building except as noted on the drawings.

B. Above Grade

- 1. Use metal conduit.

C. Below Grade

- 1. From a minimum of 1 foot inside the building to a minimum of five feet outside the building, where conduit penetrates the foundation wall: Use PVC coated metal conduit.
- 2. More than Five Feet from Foundation Wall: Use non-metallic conduit.

3.4 ADDITIONAL REQUIREMENTS FOR SPECIFIC INSTALLATIONS

A. Conduit installed within cast-in-place concrete flooring above grade or cast-in-place concrete walls.

- 1. Not allowed

B. Conduit installed below cast-in-place concrete flooring on grade.

- 1. Conduits may be installed below concrete flooring, except in locations listed below and/or as indicated on drawings:
 - a. Electrical rooms.
 - b. Mechanical rooms.
- 2. Use non-metallic conduit with rigid steel stub-ups and elbows.
- 3. Route conduit under slab from point-to-point.

4. It is the responsibility of the EC to verify slab depth and proper burial depth based on proposed conduit size. Maintain a minimum of 1 inch between the bottom of the concrete floor slab and the top of the conduit or duct bank.

C. Damp and wet locations.

1. Use nonmetallic conduit.
2. Use conduit hubs to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.

D. Ductbank

1. Size (unless otherwise indicated on the drawings):
 - a. 4" nominal for signal conduits.
 - b. 4" nominal for power conduits.
2. Material:
 - a. Schedule 40 heavy wall rigid polyvinyl chloride 90° C. UL listed, marked at uniform intervals to indicate the kind of material.
 - b. Rigid galvanized heavy wall steel.
3. Elbows: Rigid heavy wall galvanized steel long sweep with a minimum bend radius of 36 inches (915 mm).
4. Spacers: Plastic, to maintain 3" between conduits.
5. Bushings: Pre-manufactured groundable steel bushings of appropriate sizes where conduit terminators are not used. Steel bushings shall be used on all metal conduit.
6. Plugs: Closure plugs or caps of same material as conduit at ends of unused sections.
7. Tie Wire: Nonferrous, to prevent displacement of the ducts and conduits during pouring of concrete. Do not use tie wires as substitutes for the spacers.
8. Pull Wire: 1/8" nylon pull rope in each empty duct.

E. Non metallic conduit installations.

1. Install nonmetallic conduit in accordance with manufacturer's instructions.
2. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.

3.5 DELIVERY, STORAGE, AND HANDLING

- A. Accept conduit on site. Inspect for damage.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide

appropriate covering.

C. Protect PVC conduit from sunlight.

3.6 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements. All penetrations of fire and smoke walls shall be sealed with CHASE-FOAM PR-85 fire resistant foam sealant. The fire rating of the penetration shall be equal to or greater than the rating of floor or wall. Equivalent sealants as manufactured by Dow Corning and Metal Caulk are acceptable. The sealant shall meet all of the fire test and hose stream test requirements of ASTM E119-73 and shall be UL classified as a Wall Opening Protective Device.

B. Route conduits through roof openings for piping and ductwork or through an independent roof pipe curb. The roof pipe curb shall be turned over to the roofing contractor for installation. If there is not a roofing contractor for the project, install the roof pipe curb per manufacturers' written instructions.

END OF SECTION

SECTION 26 05 34

BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall and ceiling outlet boxes.
- B. Pull and junction boxes.

1.2 REFERENCES

- A. ANSI/NEMA FB 1 - Fittings and Supports for Conduit and Cable Assemblies.
- B. ANSI/NEMA OS 1 - Sheet-steel Outlet Boxes, Device Boxes, Covers, and Box Supports.
- C. ANSI/NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports.
- D. ANSI/NFPA 70 - National Electrical Code.
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum). 21

1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: ANSI/NEMA OS 1, galvanized steel.
 - 1. Luminaire Boxes: 4 inch octagon box set flush with finished surface, complete with 3/8 inch fixture stud.
 - 2. Concrete Ceiling Boxes: Concrete type, 4 inch octagon box with minimum 2-1/8 inch depth, complete with 3/8 inch fixture stud.
 - 3. Device Boxes: 4 inch square with raised cover having square corners and internally mounted ears, 1-1/2 inch deep minimum or square corner, galvanized masonry type with internally mounted ears, 2 1/2 inch deep minimum.
- B. Box Support Bracket: Sheet metal box support bracket for metal stud walls, B-Line BB4 series or equivalent.
- C. Cast Boxes: NEMA FB 1, Type FD, aluminum or cast fer alloy. Provide gasketed cover by

box manufacturer. Provide threaded hubs.

2.2 PULL AND JUNCTION BOXES

A. General Purpose Junction and Pull Boxes:

1. NEMA OS 1, fabricate from code gauge galvanized steel, with covers held in place by corrosion resistant machine screws.
2. Size as required by code for number of conduits and conductors entering and leaving box.
3. Provide with welded seams, where applicable, and equip with corrosion-resistant nuts, bolts, screws, and washers.

B. Weatherproof Junction and Pull Boxes:

1. Stainless steel or cadmium plated malleable iron cast type with threaded hubs, cast cover, and neoprene gasket.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections and compliance with regulatory requirements.
- B. Verify locations of all floor boxes with Architect prior to rough-in.
- C. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose. Exact location is to be verified and shall be determined by:
 1. Construction or code requirements.
 2. Conflict with equipment of other trades.
 3. Equipment manufacturer's drawings.
- D. Where receptacles and communications outlets are indicated adjacent to each other on the drawings, the outlet boxes shall be physically adjacent to each other and not spaced according to stud spacings. The Contractor shall fabricate box supports to allow all outlet boxes to be mounted adjacent to each other within the same stud space.
- E. Minor modifications in the location of outlets and equipment is considered incidental up to a distance of 10 feet, provided the change in location is requested prior to rough-in.
- F. Install electrical boxes to maintain headroom and to present neat mechanical appearance. Locate boxes so as to assure accessibility of electrical wiring.
- G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.

- H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
- I. Install boxes to preserve fire resistance rating of partitions and other elements.
- J. Align adjacent wall-mounted outlet boxes for switches, thermostats, and similar devices with each other.
- K. Use flush mounting outlet boxes in finished areas.
- L. Do not install flush mounting boxes back-to-back in walls; provide minimum 12 inch separation. Provide minimum 24 inches separation in acoustic rated walls.
- M. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- N. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- O. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- P. Use adjustable steel channel fasteners for hung ceiling outlet box.
- Q. Do not fasten boxes to ceiling support wires.
- R. Support boxes independently of conduit.
- S. Use gang box where more than one device is mounted together. Do not use sectional box.
- T. Use gang box with plaster ring for single device outlets.
- U. Use cast outlet box in exterior locations and wet locations.
- V. Use handy boxes only where specifically detailed on the drawings.
- W. Boxes shall be sized per code to accommodate the number and size of conduit entrances to the box and to accommodate the number of conductors, splices, fittings, etc. within the box. Box extensions used solely to create additional box volume to meet N.E.C. box fill requirements shall be prohibited.
- X. Provide additional support for all recessed mounted wall boxes in metal stud walls so that the box will be stabilized in the stud space by utilizing a box support bracket. Provide proper box support based on wall stud size.

3.2 INTERFACE WITH OTHER PRODUCTS

- A. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- B. Coordinate mounting heights and locations of outlets mounted above counters, benches and backsplashes.
- C. Position outlet boxes to locate luminaries as shown on reflected ceiling plan.

- 1 3.3 ADJUSTING

2 A. Adjust flush-mounting outlets to make front flush with finished wall material.

3 B. Install knockout closure in unused box opening.

4 END OF SECTION

SECTION 26 05 43

UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal conduit.
- B. Duct.

1.2 UNIT PRICE - MEASUREMENT AND PAYMENT

- A. Basis of Measurement: By the lineal foot, for each configuration.
- B. Basis of Payment: Includes purchase, delivery, and installation of duct, fittings, supports, and accessories, and for trenching, concrete encasement, and backfill.

1.3 REFERENCES

- A. ANSI/ASTM A153 - Zinc Coating (Hot Dip) on Iron and Steel Hardware.
- B. ANSI/ASTM A569 - Steel, Sheet and Strip, Carbon (0.15 Maximum Percent), Hot-Rolled, Commercial Quality.
- C. ANSI/IEEE C2 - National Electrical Safety Code.
- D. ANSI/NFPA 70 - National Electrical Code.
- E. ASTM A48 - Gray Iron Castings.
- F. ASTM A123 - Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strips.

1.4 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of exact routing of ductbank.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.6 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of duct bank prior to excavation for rough-in.

- C. Duct bank routing is shown on Drawings in approximate locations unless dimensions are indicated. Route as required to complete duct system.

PART 2 PRODUCTS

2.1 CONDUIT

- A. See specification section 26 05 31 for conduit information.

2.2 GROUNDING

- A. Steel grounding bushings shall be grounded to junction box ground. On steel conduit with end bells, provide an Appleton Catalog No. XJB series or equal bonding fitting with bonding strap.

- B. Connect bonding strap to ground wire in manhole or junction box.

2.3 CONCRETE ENCASEMENT

- A. Concrete shall be as specified in Section 03 30 00.

- B. Encase duct with 3 in. minimum of concrete on top, bottom, and sides with top of ductbank crowned to prevent puddling of water.

PART 3 EXECUTION

3.1 DELIVERY, STORAGE, AND HANDLING

- A. Accept conduit on site. Inspect for damage.

- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.

3.2 EXCAVATIONS

- A. Excavate trenches for ductbank to adequate width, depth, and proper slope as specified in Section 31 23 00.

- B. Install forms on sides of ductbank if trench is not of proper firmness to prevent cave-in.

- C. Bottom of trench shall be undisturbed earth. If trench bottom is too low for proper grade, fill to proper level with sand and mechanically compact it.

- D. Each excavated section from manhole to manhole and from manhole to building shall be completely excavated and graded before any duct is laid in that section.

3.3 PLACEMENT OF CONDUIT

- A. Within five (5) feet of each box pad, or concrete pad penetration install heavy wall galvanized steel conduit within the concrete envelope to provide protection against vertical shearing.

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- B. Core drill all existing walls, footings and manholes and waterproof per directions on the drawings after the new conduit is installed.
- C. Install spacers as recommended by conduit manufacturer and requirements stated above, but not to exceed a maximum of 6 ft-0 in. on center for PVC conduit and 8'-0" on center for steel conduit.
- D. Pitch conduit properly for drainage to manhole or pull box and to prevent low pockets or irregular dips between conduit ends. Minimum pitch to be 4 in. per 100 ft.
- E. Install not more than three 90 degree bend or equivalent between pullpoints.
- F. Install insulated, grounding bushings on duct ends in equipment enclosure.
- G. Plug or cap empty conduits.
- H. Seal all spare ducts and conduits, at all new and existing building entrances and at outdoor terminations at equipment pedestals with a suitable compound to prevent the entrance of moisture and gases.

3.4 PLACEMENT OF CONCRETE

- A. The Contractor shall supervise the placement of concrete of in the ductbank.
- B. Complete entire section of conduit from pad to building before encasement by concrete.
- C. Place concrete as specified in Section 03 30 00. Top of concrete envelopes shall be not less than 24 inches below grade unless indicated otherwise on the drawings.
- D. Extend concrete envelope to finish floor grade or interior wall surface in buildings at finish pad grade at equipment. Maintain moisture seal.
- E. Conduits in completed ductbanks shall be straight to within 1/4 in. per 100 ft in both vertical and horizontal directions.
- F. Pull mandrels and swabs (diameter 1/4 in. smaller than conduit) through each conduit in completed ductbank before installing cables.

3.5 BACKFILL

- A. Install underground non-detectable warning tape 12" below finish grade over all duct banks. Tape shall be red with the words "CAUTION – Buried Electric Line Below". Tape shall be Seton Catalog No. 47586 or equal.
- B. Compact backfill around ductbanks in accordance with Section 31 23 00.
- C. Restore areas to original conditions or as indicated on drawings after installation of ductbanks.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit markers.

1.2 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.4 SUBMITTALS

- A. Submit the method of labeling for the wiring device labeling method. Also, submit the method of nameplate labeling for electrical distribution equipment as herein indicated.

PART 2 PRODUCTS

2.1 NAMEPLATES

- A. Nameplates: Engraved three-layer laminated plastic. Nameplates for equipment which are served from the normal distribution system shall have black letters on white background. Nameplates for equipment which are served from the emergency distribution system shall have white letters on a red background.

- B. Locations:

- 1. Each electrical distribution and control equipment enclosure.

- C. Letter Size:

- 1. Use 3/16 inch letters for identifying individual equipment and loads.
 - 2. Use 1/4 inch letters for identifying grouped equipment and loads.

2.2 DEVICE LABELS

- A. Labels: Embossed adhesive tape, with 3/16 inch black letters on white background. Use

for identification of individual wall switches and receptacles, and control device stations.

2.3 WIRE MARKERS

A. Description: Split sleeve type adhesive markers.

B. Locations: Each conductor at panelboard gutters, pull boxes, outlet and junction boxes, and each load connection.

C. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.

2. Control Circuits: Control wire number indicated on schematic and interconnection diagrams on drawings.

3. System Circuits: All wiring associated with the various systems shall be identified with the circuit number and type. For example, fire alarm wiring shall be identified as notification circuit (audio and/or visual) and initiation circuits (signaling line or zoned).

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive nameplates and labels.

3.2 VERBIAGE

A. The verbiage utilized for identification purposes shall be the actual names or room numbers as designated by the Owner.

3.3 APPLICATION

A. Install nameplates and labels parallel to equipment lines.

B. Secure nameplate to equipment front using adhesive.

C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.

D. Color Coding for Wiring:

1. 480 Volt System: Conductors shall be identified brown, orange and yellow with a gray neutral. (A Phase - Brown, B Phase - Orange, C Phase - Yellow.)

2. 208 Volt System: Conductors shall be identified black, red and blue with a white neutral. (A Phase - Black, B Phase - Red, C Phase - Blue.)

E. Junction and pull boxes shall be stenciled as follows:

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1. Light and Power - 208V, 480V or actual line to line voltage. Indicate the panel and circuit number housed within the junction and pull box.
 2. Emergency Power - LS for life safety branch (NEC Article 700 Loads) EQ for equipment branch (NEC Article 702 Loads). Indicate the panel and circuit number housed within the junction and pull box.
 3. Telecommunication/Data - COM.
 4. Public Address System - PA. Indicate the panel and circuits and/or zones housed within the box and which amplifier the circuit or zone originates from.
 5. Security - SEC.
- F. Receptacle covers shall be labeled with the panelboard designation and the circuit number. Install labels in a neat and concise manner. Handwritten identification is not acceptable.
- G. Panelboard nameplates shall be engraved as follows:
1. Panelboard Designation: Per the drawings.
 2. The Utilization Voltage: For example, "208/120V 3 PHASE 4 WIRE".
 3. The designation of the panelboard, switchboard, motor control center, etc., from which this panelboard is served.
 4. The room where the source panelboard, switchboard, motor control center, etc., is located. If the source panelboard, switchboard, motor control center, etc. is in the same room, then indicate "THIS ROOM" on the nameplate.
- H. Motor starter and VFD nameplates, when furnished by the Electrical Contractor, shall be engraved with the following:
1. Motor starters and VFDs shall be identified as to the load served. Where the load served is a motor, the HVAC motor designation or other description (ex. Elevator #1) shall be used in lieu of the motor number on the electrical drawings.
 2. The designation of the panelboard, switchboard, motor control center, etc., which this motor starter is served from. Utilize the designation as per the drawings.
- I. Disconnect switch and enclosed circuit breaker nameplates shall be installed as follows:
1. For enclosed circuit breakers in public areas, the nameplates shall be attached to the inside face of the cover. Nameplates for enclosed circuit breakers and disconnect switches in equipment rooms and other non-public areas shall be attached to the outside face of the cover. The lettering on the nameplates shall be engraved with the following information:
 - a. The designation of the panelboard, switchboard, motor control center, etc., which this equipment is served from. Utilize the designation per the drawings.
 - b. Load served which shall be the next downstream device (panelboard,

transformer, transfer switch, motor, etc.). Where the load served is a motor, the HVAC motor designation or other description (i.e. elevator #1) shall be used in lieu of the motor number on the electrical plans.

J. Automatic and Manual transfer switch nameplates shall be installed as follows:

1. Provide the with an identification plate mounted in approximately the horizontal center of the transfer switch and at approximately eye level. Nameplate shall be engraved as follows:
 - a. Designation per the drawings.
 - b. The Utilization Voltage: For example, "120/208V 3 PHASE, 4 WIRE".
 - c. The designation of both the normal and emergency panelboards, switchboards, motor control centers, substations etc., from which this transfer switch is served. Utilize the designation per the drawings.
 - d. The rooms where the normal and emergency source panelboards, switchboards, motor control centers, substations etc., are located.
 - e. The downstream load served by this transfer switch (panelboard, transformer, motor control center, switchboard substation, etc.). Where the load served is a motor, the HVAC motor designation or other description (ex. elevator no. 1) shall be used in lieu of the electric motor number on the electrical plans.

K. Individually mounted transformers, such as indoor dry type or outdoor pad mounted unit nameplates shall be engraved as follows:

1. Transformer Designation: Per the drawings.
2. The designation of the panelboard, switchboard, motor control center, etc., which this transformer is served from.
3. The room where the source panelboard, switchboard, motor control center, etc., is located if remote from the transformer.
4. The designation of the panelboard switchboard, motor control center, etc., served by this transformer. Utilize the designation indicated on the drawings.

L. Uninterruptible Power Supply or Lighting Inverters:

1. Unit Designation: Per the drawings.
2. The Input Voltage: For example, "480/277V 3 PHASE, 4 WIRE".
3. The Output Voltage: For example, "120/208V 3 PHASE, 4 WIRE".
4. The designation of the panelboard or switchboard which this unit is served from.
5. The room where the source panelboard or switchboard is located if remote from the unit.
6. The designation of the panelboard or switchboard served by this unit. Utilize the

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1 designation indicated on the drawings.

2 END OF SECTION

SECTION 26 05 71

ELECTRICAL DISTRIBUTION SYSTEM STUDIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Short Circuit Study
- B. Protective Device Coordination Study
- C. Arc-Flash Hazard Analysis

1.2 REFERENCES

- A. The studies shall be performed in strict accordance with the latest revision of the following standards:
 - 1. ANSI/IEEE Std. 141-1986 IEEE Recommended Practice for Electric Power Distribution for Industrial Plants.
 - 2. ANSI/IEEE Std. 242-1986 IEEE Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
 - 3. ANSI/IEEE Std. 602-1986 IEEE Recommended Practice for Electric System in Health Care Facilities.
 - 4. ANSI C57.12.59 Guide for Dry-Type Transformer Through-Fault Current Duration.
 - 5. ANSI C57.109 Guide for Transformer Through-Fault-Current Duration.
 - 6. IEEE Standard 1584 Guide for Performing Arc-Flash Calculations.
 - 7. Insulated Cable Engineers Association Standards. National Electrical Code, ANSI/NFPA 70. OSHA.

1.3 DESCRIPTION OF WORK

- A. The electrical system short-circuit and protective device coordination studies shall include the new distribution system associated with this project.
- B. Collect field data as required. This shall include gathering information on new and existing motors, length and clarification of new feeders and new device characteristics.
- C. Perform a digital-computer-based short-circuit study using the latest ANSI/IEEE Standards calculation methods.
 - 1. System connections which result in maximum fault conditions shall be adequately covered in the study.

2. Short-circuit momentary duty values and interrupting duty values shall be calculated on the basis of assumed three-phase bolted faults, line-to-line faults, line-to-line-to-ground faults, line-to-ground faults, and three-phase-to-ground faults at each switchboard and switchgear bus, transformer, panel boards and significant location in the system. Short circuit study shall also include calculations based upon multiple sources, such as alternate utility sources, system bus ties (in optional system configurations), standby emergency systems, etc.
 3. The short-circuit tabulations shall include symmetrical fault currents and X/R ratios. For each fault location, the total duty on the bus as well as the individual contribution from each connected branch shall be listed with its respective X/R ratio.
 4. Compare the results of the short circuit study with the short circuit ratings of the new and existing equipment (if applicable) to evaluate their capability to withstand and clear a fault condition and provide personnel protection, without heavy damage to the equipment or surroundings. Verify that all equipment is applied within its rating. Provide a report to summarize the data and the results of the short-circuit study. Provide recommendations to adjust or replace equipment that is not properly rated for the available short-circuit current.
 5. Conductor for data table including all feeder characteristics and overcurrent protection.
- D. Using the results of the short-circuit study, perform a protective device coordination study for the system described in Section 1.3.A above.
1. The coordination study shall include computer-drawn coordination curves which illustrate proper relay/breaker settings and fuse size selection to obtain proper coordination and protection of the equipment. The coordination curves shall be drawn on Keuffel and Esser log-log paper #48-5258 or approved computer equivalent.
 2. The plots (no longer than 11" x 17") shall include complete titles, a simplified single-line diagram for the portion of the system being coordinated, significant motor starting characteristics, complete parameters of transformers, minimum melt and total clearing characteristics of fuses, and complete operating bands of low voltage circuit breaker trip curves. The coordination plots shall indicate the type of protective devices selected, proposed relay taps, time dial and instantaneous settings, transformer magnetizing inrush and ANSI withstand curves, cable thermal over-current withstand limits, and significant symmetrical and asymmetrical fault currents. A maximum of eight (8) devices shall be shown on any sheet.
 3. All restrictions of the NEC shall be adhered to and proper coordination intervals and separation of characteristic curves shall be maintained.
 4. Separate coordination plots shall be provided for phase devices and ground-fault devices.
 5. The coordination study shall include protective device setting records for each

substation, switchgear lineup, switchboard, panelboard, etc. A report shall be provided to summarize the results of the protective device coordination study. The report shall include relay and circuit breaker setting sheets and coordination curves. Recommendations shall be provided including but not limited to missing devices, misapplied devices, NEC violations, or devices that are not providing satisfactory protection and/or coordination.

E. As part of the studies, a listing of recommended relays, circuit breakers, fuses, etc., including complete ordering information, shall be provided in a timely fashion.

F. The Arc-Flash Hazard Analysis

1. The analysis shall be performed with the aid of computer software intended for this purpose in order to calculate Arc-Fault Incident Energy (AFIE) levels and flash protection boundary distances.
2. The analysis shall be performed on conjunction with a short-circuit analysis and a time-current coordination analysis.
3. Results of the analysis shall be submitted in tabular form, and shall include device or bus name, bolted fault and arcing fault current levels, flash protection boundary distances, personal-protective equipment classes and AFIE levels.
4. The analysis shall be performed under worst-case arch-flash conditions, and the final report shall describe, when applicable, how these conditions differ from worst-case bolted fault conditions.
5. The analysis shall be performed by a registered professional engineer.
6. The analysis shall be performed in compliance with IEEE Standard 1584-2002, the IEEE Guide for Performing Arc-Flash Calculations.
7. The analysis shall include recommendations for reducing AFIE levels and enhancing worker safety.
8. The proposed vendor shall demonstrate experience with Arc-Flash Hazard Analysis by submitting names of at least ten actual arc-flash hazard analyses is has performed in the past year.
9. The proposed vendor shall demonstrate capabilities in providing equipment, services and training to reduce arc-flash exposure and train workers in accordance with NFPA 70E and other applicable standards.
10. The proposed vendor shall provide equipment labels in compliance with NEC-2002 Section 110 and ANSI Z535.4 to identify AFIE and appropriate Personal Protective Equipment classes.

1.4 QUALIFICATIONS

A. The Contractor shall have the studies performed by qualified Engineers of the switchgear manufacturer or by an Owner-approved consultant. The Contractor is responsible for

providing all pertinent information required by the preparers of the studies.

B. The study shall be performed by an engineer registered in the state where the project is located.

C. The final study shall be sealed and signed by the study engineer.

D. The equipment manufacturer or consulting engineer shall specialize in perform short circuit and protection devices studies and shall have a minimum of five years experience.

1.5 SUBMITTALS

A. Submit the studies under provisions of Section 26 05 00 and Division 1.

B. Within two (2) weeks of award of the Contract, submit resume of the Study Engineer's qualifications.

C. The studies shall be accomplished so that circuit breaker and/or relay specification recommendations are submitted prior to or at the same time as the distribution equipment shop drawings so that the correct relays or circuit breaker options are ordered in a timely manner at no added cost to the Owner.

D. Submit the final report in the quantity dictated by the Architect/Engineer. The final report shall include the following:

1. Description, purpose, basis, and scope of the study and a single-line diagram of that portion of the power system which is included within the scope of the study.

2. Tabulations of circuit breakers, fuse, and other protective device ratings versus calculated short circuit duties and commentary on same.

3. Fault current calculations including a definition of terms and guide for interpretation of computer print-out.

4. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, fuse selection, and commentary. same.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 GENERAL

A. Implementation of the study recommendations shall take place only after the Engineer and Owner's approval.

B. The Contractor shall hire an independent testing contractor to perform protective device calibration and apply prescribed settings. This Contractor shall assist testing contractor by providing work force and materials as required.

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- 1 C. The Contractor shall install and mark the arc flash equipment labels after the short circuit
2 and protective device coordination studies have been completed and implemented.

3 END OF SECTION

SECTION 26 08 11

TESTING ELECTRICAL SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Field testing of electrical distribution equipment.

1.2 REFERENCE STANDARDS

- A. National Electrical Manufacturer's Association (NEMA).
B. American Society for Testing and Materials (ASTM).
C. Institute of Electrical and Electronic Engineers (IEEE).
D. National Electrical Testing Association (NETA).
E. Insulated Cable Engineers Association (ICEA).
F. American National Standards Institute (ANSI).

1.3 SYSTEM DESCRIPTION

- A. Prior to energizing equipment, the Electrical Contractor shall perform the tests as specified herein.
- B. All new electrical equipment installed as part of this project shall be tested, where a test is specified herein. Test values shall conform to the equipment manufacturer's recommendations and the latest edition of the NETA Acceptance Testing Specifications.
- C. Assure that electrical equipment is operational within industry and manufacturer's tolerances and is installed in accordance with design specifications.
- D. Items to be tested:
1. Branch circuit wiring.
 2. Feeders.
 3. Receptacles.
 4. Motors.
 5. Grounding.
 6. Transfer switches.
 7. Standby engine generators.

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8. Dry type transformers (600 volt primary or less).
9. Circuit breakers - low voltage.
10. Panelboards.
11. Transient voltage surge suppressors and surge arresters.
12. Uninterruptible power supplies.

E. Inspections and tests shall utilize the following references:

1. Project design specifications.
2. Project design drawings.
3. Manufacturer's instruction manuals applicable to each particular apparatus.
4. Above referenced standards.

F. Electrical Contractor's responsibilities:

1. Supply a source of test power to independent testing contractor at each test site.
2. Coordinate work to minimize project delay.

G. Recommendations for acceptance or rejection shall be given upon consultation of Engineer, Owner, and Contractor.

1.4 SUBMITTALS

- A. Submit proof of independent testing contractor qualifications.
- B. Test reports:
 1. Seven copies of complete testing report.
 2. Submit report no later than 30-days after completion of testing.

1.5 PROJECT RECORD DOCUMENTS

- A. Record actual equipment nameplate information.
- B. Permanently record checks and tests and make available to Engineer and Owner.

1.6 QUALITY ASSURANCE

- A. Requirements of regulatory agencies:
 1. National Fire Protection Association (NFPA):
 - a. NFPA-70 National Electrical Code (NEC).

1.7 QUALIFICATIONS

- A. Meet federal, state, and local safety requirements for accreditation of testing laboratories, Title 29, Part 1907. Membership in National Electrical Testing Association constitutes proof of meeting such criteria.
- B. Meet Federal Department of Commerce requirements for nationally independent testing laboratory certification.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 GENERAL FIELD TESTING REQUIREMENTS

- A. Test work and equipment installed to ensure its proper and safe operation in accordance with intent of drawings and specifications.
- B. Check interlocking and automatic control sequences and test operation of safety and protective devices.
- C. Correct defects.
- D. Cooperate with electrical utility, suppliers, and manufacturer's representatives in order to achieve proper and intended operation of equipment.
- E. Test, adjust and record operating voltages at each system level before energizing branch circuits.
- F. Transformer taps must be adjusted to obtain as near as possible nominal system voltage.
- G. Where transformer is under utility jurisdiction, obtain services of utility to correct voltage.
- H. Replace devices and equipment damaged due to failure to comply with this requirement.
- I. Balance load among feeder's conductors at each panelboard, switchboard, or substation, and reconnect loads as may be necessary to obtain a reasonable balance of load on each phase. Electrical unbalance shall not exceed 7-1/2% between phases. If the Electrical Contractor feels that because of the nature of the load, a 7 1/2% or less unbalance cannot be achieved, the Electrical Contractor shall submit written request to the Engineer for approval.

3.2 BRANCH CIRCUIT WIRING

- A. See Section 26 05 21 for additional information.

3.3 FEEDERS

- A. Verify cable color coding with applicable specifications and the National Electrical Code.

B. Each feeder shall be megger tested for insulation resistance.

3.4 RECEPTACLES

A. Verify that each receptacle device is energized.

B. Test each receptacle device for proper polarity.

C. Test each GFCI receptacle device for proper operation.

3.5 GROUNDING

A. VISUAL AND MECHANICAL INSPECTION

1. Inspect ground system for compliance with drawings and specifications.

2. Verify that all electrical distribution equipment is properly grounded.

B. ELECTRICAL TESTS

1. Fall of Potential test per IEEE Standard No. 81 on main grounding electrode or system.

2. Two Point Method test per IEEE Standard No. 81 to determine ground resistance between main grounding system, and major electrical equipment frame, system neutral and/or derived neutral points.

3.6 DRY TYPE TRANSFORMERS (600 VOLTS AND LESS PRIMARY)

A. VISUAL AND MECHANICAL INSPECTION

1. Inspect for physical damage.

2. Verify equipment is supplied and connected in accordance with design specifications.

3. Check tightness of external bolted electrical joints in accordance with manufacturer's instructions.

4. Verify resilient mounts are released.

5. Perform specific inspection and mechanical tests as recommended by manufacturer.

B. ELECTRICAL TESTS

1. Insulation resistance tests shall be performed winding-to-winding and winding-to-ground. Appropriate guard circuit shall be utilized over all bushings. Test voltage and minimum acceptable values shall be in accordance with manufacturer's recommendations.

2. Perform a turns-ratio test on all tap connections. Verify that winding polarities are

in accordance with nameplate.

3. Testing shall occur prior to making primary and secondary feeder connections (i.e. prior to placing in service).

3.7 PANELBOARDS

A. VISUAL AND MECHANICAL INSPECTION

1. Inspect for physical damage.
2. Verify equipment is supplied and connected in accordance with design specifications.
3. Inspect for proper alignment, anchorage, and grounding.
4. Check tightness of accessible bolted bus joints by calibrated torque wrench method. Refer to manufacturer's instructions for proper foot-pound levels.
5. Doors, panels and Sections shall be inspected for paint, scratches and fit.
6. Physically test all key interlocking systems.
7. Proper mechanical operation of relays, switches, and other devices.
8. Where applicable, verify fuse size are per coordination study.

B. ELECTRICAL TESTS

1. Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads to within 7 1/2 percent of each other. Maintain proper phasing for multi-wire branch circuits.
2. Megger check of phase-to-phase and phase-to-ground insulation levels prior to connection of any load circuits.

3.8 CIRCUIT BREAKERS - LOW VOLTAGE

- A. All circuit breakers regardless of size shall receive the visual and mechanical inspection as indicated below. All circuit breakers which are either 225 amp frame and larger or with a trip setting of 100 amps and larger shall be tested per this Section.

B. VISUAL AND MECHANICAL INSPECTION

1. All circuit breakers regardless of ampacity shall inspected as indicated below:
 - a. Circuit breaker shall be checked for proper mounting, conductor size and feeder designation.
 - b. Operate circuit breaker to ensure smooth operation.
 - c. Inspect case for cracks or other defects.
 - d. Check tightness of connection with torque wrench in accordance with manufacturer's recommendations.

C. ELECTRICAL TESTS

1. All circuit breakers which are either 225 amp frame and larger or with a trip setting of 100 amps and larger shall be tested as indicated below:
 - a. Measure contact resistance.
 - b. Insulation resistance shall be determined phase to phase and phase to ground. Test voltage shall be 1,000 v dc.
 - c. Perform long-time delay time-current characteristic tests by passing 300 percent rated primary current through each pole separately unless series testing is required to defeat ground fault functions.
 - d. Determine short-time pickup and delay by primary current injection.
 - e. Determine ground-fault pickup and time delay by primary current injection.
 - f. Determine instantaneous pickup current by primary injection using run-up or pulse method.

3.9 MOTORS

A. Test each motor and permanently record the following information:

1. Motor identification as to load served.
2. Nameplate data.
3. Overload relay equipment.
4. Protective relay (if any) setting.
5. Voltage and current phase readings.
6. Verify that the direction of rotation is correct. 5

C. ELECTRICAL AND MECHANICAL TESTS

1. Perform a dielectric absorption test on generator winding with respect to ground. Determine polarization index.
2. Functionally test engine shutdown for low oil pressure, overtemperature, over-speed, and other features as applicable.
3. Perform resistive load bank test at 100% nameplate rating. Loading shall be:
 - a. 25% rated load for 15 minutes.
 - b. 50% rated load for 15 minutes.
 - c. 75% rated load for 15 minutes.
 - d. 100% rated load for 1 hour.
 - e. Record voltage, frequency, load current, oil pressure, coolant temperature, outdoor and room air temperatures at 15 minute intervals during test.

3.13 TRANSIENT VOLTAGE SURGE SUPPRESSORS AND SURGE ARRESTERS

A. VISUAL AND MECHANICAL INSPECTION

1. Inspect surge arresters for physical damage, such as chipped or fractured porcelain.
2. Verify proper mounting and clearances.
3. Check external bolted joints shall be checked for tightness by calibrated torque wrench method
4. Check ground leads on each device for attachment to a ground bus or ground electrode.
5. Check exhaust ports on expulsion type arresters for any obstructions.

B. ELECTRICAL TESTS

1. Perform insulation-resistance tests. Use manufacturer's recommended values.
2. A ground continuity test shall be performed to the ground grid system.
3. Varistor surge arresters: Perform tests as recommended by the manufacturer.

END OF SECTION

SECTION 26 09 25

LIGHTING CONTROL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Control Panel
- B. Relays
- C. Cable
- D. Wall Switches.

1.2 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

1.3 SYSTEM DESCRIPTION

- A. Provide a complete low voltage relay lighting control system as indicated on the drawings and specified herein. A separate, non-integrated stand alone system shall be provided for each of the following areas:
 - B. The local low voltage switches and the lighting control panel shall be capable of controlling the same relay.
 - C. The on/off cycles for suite occupancy will be determined by the Owner/Users at time of final programming.
 - D. The lighting control system shall consist of low voltage relay control panel(s).
 - E. Each low voltage lighting control panel shall be microprocessor controlled. Programming shall be accomplished through either the RS-232 port, through the network connection, or with an integral LCD display and programming keypad.
 - F. Programmable intelligence shall include Time-Of-Day control, 32 holiday dates, warn occupants of an impending off, timed inputs, preset control, auto daylight savings, astronomical clock w/offsets, and local control, digital switches and network overrides.
 - 1. TOD: 64 Time-Of-Day/holiday schedules for 365 day programming
 - 2. Holidays: 32 holiday dates
 - 3. Warn Off: Flash lights and provide an extra 1 second to 99 minutes of illumination
 - 4. Preset: Pre-programmed switch patterns
 - 5. Timed Inputs: Switch input timers 1-999 minutes.

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- 1 6. Timed Overrides: Timed override 1-999 minutes, resumes to normal schedule
- 2 7. Local Control: From keypad & LCD display or local switch.
- 3 8. Astronomical Clock: Longitude and latitude input with sunset-sunrise offsets to
- 4 customize outdoor lighting
- 5 9. Auto Daylight Savings Adjust: Automatically adjusts the clock at the appropriate
- 6 dates, selectable.
- 7 10. Priorities: Establishes a hierarchy for inputs and network control commands.
- 8 11. Masking: Provides permission orientation to switch inputs and network commands
- 9 thereby ensuring building lighting control integrity.
- 10 12. Soft-Linking: Group linking for rapid programming
- 11 13. Global Linking: Each panel shall provide 64 addressable groups for network
- 12 linking of control commands.
- 13 G. Relays may be designated as either normally open or normally closed from the software.
- 14 Relay status shall not only disclose commanded relay status but next scheduled state to
- 15 occur.
- 16 H. Each control panel shall provide a Warn Off (flash the lights) to inform the occupants of
- 17 an impending Off command. The Warn Off command shall provide an adjustable time
- 18 duration of 1 second to 99 extra minutes. The occupants may exit the premises with
- 19 adequate lighting or cancel the Warn Off by overriding the lighting zone. This option
- 20 occurs with all Off commands except local overrides.
- 21 I. The controller shall permit lighting to be overridden On for after hours use or cleaning.
- 22 The controller shall provide optional switch timer assignments or timed overrides. The
- 23 override choices for various relays shall provide special event occurrences and the
- 24 controller shall return to the programmed state after the override event. Also, the controller
- 25 shall provide priority and masking choices to customize the functions of switch inputs,
- 26 thereby enabling switches to function differently at different times of the day to meet
- 27 special facility operational requirements. These overrides shall be digital, or hard-wired
- 28 inputs.
- 29 J. Programming the controller shall be through the RS-232 port or through the network
- 30 connection. Communication to the panel or network can be accomplished via, RS-232,
- 31 modem, or TCP/IP. Programming the controller shall also be accomplished through the
- 32 integral keypad and LCD display. Descriptive information shall assist the user to employ
- 33 the system with a programming manual. Lighting control systems that utilize removable
- 34 programming keypads shall not be acceptable.
- 35 K. Priorities and/or Masking shall be assigned to inputs, telephone override, and global
- 36 commands to insure building integrity. Priorities enable or disable the inputs based on user
- 37 actuation of overrides. Masks shall permit: On only, Off only and On & Off control for
- 38 intelligent after hours utilization of the controlled facility based on Time-Of-Day
- 39 scheduling in the controller.

L. The lighting control system shall log all control events. The controller shall monitor all relay actuations, switch inputs and user intervention. Log reports shall be available for any duration of time the operator chooses through the Keeper Enterprise Software. Runtimes for each relay shall be available from the Keeper Enterprise Software.

M. (Optional) The lighting control system shall permit LED annunciated digital switches. Each digital switch shall provide status feedback of any control relay in the entire lighting control panel.

1.4 LIGHTING CONTROL SCHEME

A. This building will operate on a set schedule. Automatic sweep-off type operations shall be required.

B. The public spaces will be controlled via the low voltage switches located throughout the space as indicated on the floor plans.

C. The exterior site lighting shall be controlled via photocell-on and time-off. The off time of the schedule shall be determined with the owner on site.

1. Coordinate best location for each photocell on the exterior of the building.

1.5 SUBMITTALS

A. Shop Drawings: Submit complete factory generated drawings. Indicate wiring diagrams of all system components, showing interface with branch circuit wiring. The drawings shall indicate all point to point wiring, including all control wiring.

B. Product Data: Provide data showing dimensions and ratings for components.

C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.6 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include replacement part numbers.

1.7 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.8 EXTRA MATERIALS

A. Provide two of each relay type or one additional relay card.

B. Provide two of each switch type.

C. Provide two of each cabinet key.

PART 2 PRODUCTS

2.1 GENERAL

A. Use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality, general configuration, and operating characteristics desired only. This specification is intended to be a minimum standard for function, operation and performance.

2.2 ACCEPTABLE MANUFACTURERS

A. Cooper Green Gate

B. By Submittal.

2.3 COMPONENTS

A. Control Panel:

1. Diagnostic Aids: Each control panel shall incorporate diagnostic aids for confirmation of proper operation, or in case of failure these aids shall guide the individual in rapid troubleshooting of the system.
2. Status Indication of Relays: The system shall provide visible status indication of all relays.
3. Operator Interface: The control panel programming interface resides in firmware in the control panel. The programming interface shall consist of a circuit board mounted keypad and LCD display. The integral keypad shall provide access to the main programming features.
4. Overrides: The controller shall provide timers for each override. Each override timer shall be capable of 0-999 minutes. Software shall enable or disable overrides based on Priorities, Masks or Time Of Day scheduling.
5. Digital Switch: The lighting controller shall support digitally addressable LED annunciated switches. The digital switch network requires CAT 5 cable between switches. The digital switches shall control any relay group combination on the lighting control network.
6. Dry Contact Inputs: The control system shall permit 8 dry contacts inputs for override purposes. Momentary 3 wire or 2 wire (toggle) inputs shall be supported. Maintained contacts shall be supported as 2 wire (SPST) inputs.
7. Photocell Control: The controller shall accept dry contact ambient light sensors. The controller shall provide power for the sensor thereby eliminating any external power supply. Sensors shall provide for outdoor and indoor applications and issue a command to the controller once the threshold is reached.
8. Remote Overrides: The controller shall accept remote commands issued from other

inputs.

9. Service Override & Priority Override: The control panel shall provide a three position master-service override for the control unit. The master service override provides a single three-position switch with the option of All Off, Auto, and All On, respectively. This master switch shall operate all of the relays in the controller. This switch shall override and supersede all commands from the logic board when the switch is in the All On or All Off position. The system shall remember the last command to the individual relays. Upon returning the master override switch to the Auto position, the relays shall return to the most recent command state.

10. RS-232 port: The controller shall provide an RJ-12 connection for RS-232 communications. Programming shall be permitted through either a local connection or remotely through a modem.

11. Memory Back-up: The system shall utilize a memory back-up device that will protect the data in RAM against power interruptions lasting as long as 7 days

12. Multi-tapped Transformer: The control panel shall incorporate the use of a multi-tapped transformer to allow the use of 120 & 277 VAC.

13. Lockable Enclosure: Each control panel shall be enclosed in a lockable NEMA class 1 steel enclosure.

B. Relays: Electrically held 20amp 120/277VAC relays. Relays shall be Normally Open. The relays shall be rated for 10 million mechanical operations.

1. Standard Relay Card (SRM-NO): The system shall utilize normally open control relays, which are rated to 20 amps at 120/277 VAC. The relays shall be magnetically held and are provided on a card of eight relays per card. The wire terminations shall be able to accept 10 AWG. The relays shall be rated for 10 million mechanical operations.

C. Plenum Cable: Copper conductor, 300 volt insulation rated 60 degrees C, individual conductors twisted together and covered with nonmetallic jacket; suitable for use in environmental air spaces. Cable shall be fire rated.

D. Wall Switches: Wall switches shall be SPDT 3 wire momentary contact switches fabricated from high impact plastic and rated for 3A at 24V AC/DC. Wall plates shall be smooth, high impact nylon. The EC shall group two momentary contact switches per single gang opening. Utilize single and double gang faceplates to provide the indicated number of switches.

1. Single switch, single gang outlet box: RP2-111

2. Two switches, single gang outlet box: RP2-122

3. Three switches, double gang outlet box: RP2-232

4. Four switches, double gang outlet box: RP2-242

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Verify field measurements are as shown on Drawings and/or as instructed by the manufacturer.
- C. Verify that required utilities are available, in proper location, and ready for use.
- D. Beginning of installation means installer accepts conditions.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Use 20 AWG, minimum, stranded copper conductor building wire in conduit for low voltage wiring in walls, above inaccessible ceilings, and where run exposed. Use remote control and signal cable suitable for purpose above accessible ceilings.
- C. Install relays to be accessible. Allow space for adequate ventilation and circulation of air.
- D. Provide typed circuit directory for each cabinet. The directory shall accurately indicate the panelboard and circuit being controlled, groups of luminaires served and the rooms in which the luminaires are located. The rooms and panelboards shall be designated by the actual name or number designated by the Owner.
- E. Provide engraved plastic nameplates under the provisions of Section 26 05 53.

3.3 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 26 08 11.
- B. Perform operation test on completed installation to verify proper operation.
- C. Replace equipment, components, and wiring which is proved to be defective.
- D. System shall test free from grounds, shorts and open circuits.

3.4 ADJUSTING

- A. Adjust work under provisions of Section 26 05 00.
- B. Adjust system to accomplish proper system operation.

3.5 DEMONSTRATION

- A. Provide systems demonstration by a fully qualified, trained representative of the equipment supplier.
- B. Provide a total of 2 hours of demonstration and training for the system. Demonstrate

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1 normal and abnormal modes of operation, and required responses to each.

2 END OF SECTION

SECTION 26 22 14

DRY TYPE TRANSFORMERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Energy efficient dry type transformers.

1.2 REFERENCES

- A. ANSI/IEEE C57.12.01 - General Requirements for Dry-Type Distribution and Power Transformers Including Those With Solid Cast and/or Resin-Encapsulated Windings.
- B. ANSI/IEEE C57.12.91 - Test Code for Dry Type Distribution and Power Transformers.
- C. ANSI/IEEE C89.2 - Dry Type Transformers for General Applications.
- D. NEMA ST20 - Dry Type Transformers for General Applications.
- E. NEMA TP-1 - Guide for Determining Energy Efficiency for Distribution Transformers.
- F. NEMA TP-2 - Standard Test Method for Measuring Energy Consumption of Distribution Transformers.
- G. NFPA 70 - National Electrical Code.
- H. UL 1561 - Dry Type General Purpose and Power Transformers.
- I. See the transformer schedule on the drawings for specific features required for this project.

1.3 EQUIPMENT DIMENSIONS

- A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable, unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting bid if the dimensional increases will be greater than 6 inches in any dimension.

1.4 SUBMITTALS

- A. Product Data: Provide outline and support point dimensions of enclosures and accessories, unit weight, voltage, KVA, and impedance ratings and characteristics, tap configurations, insulation system type, and rated temperature rise.
- B. Test Reports: Indicate loss data, efficiency at 25, 50, 75 and 100 percent rated load, and sound level.
- C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1 1.5 OPERATION AND MAINTENANCE DATA

- 2 A. Manufacturer's Instructions: Indicate application conditions and limitations of use
3 stipulated by Product testing agency specified under Regulatory Requirements. Include
4 instructions for storage, handling, protection, examination, preparation, installation, and
5 starting of Product.

6 1.6 QUALITY ASSURANCE

- 7 A. Perform Work in accordance with NEMA Standard of Installation.

8 1.7 REGULATORY REQUIREMENTS

- 9 A. Conform to requirements of NFPA 70.

- 10 B. Furnish products listed and classified by Underwriters Laboratories or the testing firm
11 acceptable to authority having jurisdiction as suitable for purpose specified and shown.

12 PART 2 PRODUCTS

13 2.1 ACCEPTABLE MANUFACTURERS

- 14 A. Square D.
15 B. General Electric.
16 C. Siemens.
17 D. Cutler Hammer.

18 2.2 ENERGY EFFICIENT TRANSFORMERS

- 19 A. Description: NEMA ST 20, factory-assembled, air cooled dry type transformers, ratings as
20 indicated with a K-1 rating.

- 21 B. Transformers shall be low loss type with minimum efficiencies per NEMA TP-1 when
22 operated at 35% of full load capacity. Efficiencies shall be tested in accordance with
23 NEMA TP-2.

- 24 C. Efficiency Ratings:

Single Phase		Three Phase	
KVA	Efficiency	KVA	Efficiency
15	97.7	15	97.0
25	98.0	30	97.5
37.5	98.2	45	97.7
50	98.3	75	98.0
75	98.5	112.5	98.2
100	98.6	150	98.3
167	98.7	225	98.5
250	98.8	300	98.6

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Single Phase		Three Phase	
KVA	Efficiency	KVA	Efficiency
333	98.9	500	98.7
		750	98.8
		1000	98.9

D. Insulation system and average winding temperature rise for rated KVA as follows:

1. 15 KVA and larger: Rated for 220 degree C UL Component Recognized insulation system, 150 degrees C. rise above a 40 degree C ambient.
2. Transformer coils shall be of the continuous wound type and shall be impregnated with a nonhygroscopic, thermosetting varnish.

E. Case temperature: Do not exceed 50 degrees C. rise above ambient at warmest point.

F. Winding Taps:

1. Transformers Less than 25 KVA: Two 5 percent full capacity taps on primary winding below rated voltage.
2. Transformers 25 KVA and Larger: Six 2 1/2 percent full capacity taps on primary winding, 2 above and 4 below rated voltage.

G. Sound Levels: Maximum sound levels are as follows:

1. 0 to 9 KVA - 40 dB.
2. 10 to 50 KVA - 45 dB.
3. 51 to 150 KVA - 50 dB.
4. 151 to 300 KVA - 55 dB.
5. 301 to 500 KVA - 60 dB.
6. 501 to 700 KVA - 62dB.
7. 701 to 1000 KVA - 64 dB.

H. Basic Impulse Level: 10 KV.

I. All cores to be constructed with low hysteresis and eddy current losses. The core flux density shall be well below the saturation point to prevent core overheating. The complete core and coil shall be bolted to the base of the enclosure, but isolated by means of rubber vibration-absorbing mounts.

J. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding conductor sized in accordance with applicable UL and NEC standards.

K. Enclosure: NEMA ST 20; Type 1. The transformer enclosures shall be ventilated and be

fabricated of heavy gauge sheet steel construction. The entire enclosure shall be finished utilizing a continuous process consisting of degreasing, cleaning and phosphatizing, followed by electrostatic deposition of a polymer polyester powder coating and baking cycle to provide uniform coating of all edges and surfaces. The coating shall be UL recognized for outdoor use. The coating color shall be ANSI 49. Provide lifting eyes or brackets.

L. Mounting: Suitable for wall, floor, or trapeze mounting, except transformers larger than 75 KVA, suitable for floor or trapeze mounting.

M. Coil Conductors: Aluminum, continuous windings with terminations brazed or welded.

N. Nameplate: Include transformer connection data; KVA, primary and secondary voltage ratings; percent impedance and overload capacity based on rated allowable temperature rise.

2.3 OPTIONS

A. The accessories below apply to each transformer as indicated on the transformer schedule shown on the drawings.

1. OPTION 1:

a. Non ventilated enclosure.

2. OPTION 2:

a. Integral strip heaters: 120V 250W with thermostat.

3. OPTION 3:

a. Weathershield to upgrade enclosure to a NEMA 3R rating.

PART 3 EXECUTION

3.1 INSPECTION

A. Examine areas and conditions under which transformers are to be installed and notify Engineer, in writing, of conditions detrimental to proper and timely completion of work.

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

3.2 PREPARATION

A. If floor set, provide 3 1/2" high concrete pad under floor mounted transformers.

B. If ceiling or wall hung, provide appropriate mounting bracket and supports rated to support the weight of the supplied transformer.

3.3 DELIVERY, STORAGE, AND HANDLING

A. Deliver transformers individually wrapped for protection and mounted on shipping skids.

- B. Accept transformers on site. Inspect for damage.
- C. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- D. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

3.4 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Set transformer plumb and level.
- C. Use flexible conduit, under the provisions of Section 26 05 31, 2 ft (0.6 M) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.
- D. Release resilient mounts in transformer enclosure. Mount transformers on vibration isolating pads suitable for isolating the transformer noise from the building structure.
- E. Provide grounding and bonding in accordance with Section 26 05 26.
- F. Provide engraved plastic nameplates under provisions of Section 26 05 53.

3.5 FIELD QUALITY CONTROL

- A. Field testing will be performed under provisions of Section 26 08 11.
- B. Check for damage and tight connections prior to energizing transformer.
- C. Measure primary and secondary voltages and make appropriate tap adjustments.

3.6 ADJUSTMENTS AND CLEANING

- A. Adjust voltage taps for required system voltage and check grounding requirements.
- B. Tighten lugs and bus connections.
- C. Clean interior of equipment.
- D. Sand, prime and paint scratched or marred surfaces to match original finish.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Power panelboards.
 - 1. Circuit Breaker Type
- B. Branch circuit panelboards.

1.2 REFERENCES

- A. NECA (National Electrical Contractors Association) "Standard of Installation."
- B. NEMA AB 1 - Molded Case Circuit Breakers.
- C. NEMA ICS 2 - Industrial Control Devices, Controllers, and Assemblies.
- D. NEMA KS 1 - Enclosed Switches.
- E. NEMA PB 1 - Panelboards.
- F. NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.
- G. NFPA 70 - National Electrical Code.
- H. UL 50 – Enclosures for Electrical Equipment.
- I. UL 67 – Panelboards.
- J. UL 98 – Enclosed and Dead-front Switches.
- K. UL 489 – Molded-case Circuit Breakers and Circuit Breaker Enclosures.

1.3 EQUIPMENT DIMENSIONS

- A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable, unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting bid if the dimensional increases will be greater than 6 inches in any dimension.

1.4 SUBMITTALS

- A. Shop Drawings: Indicate outline and support point dimensions, component list, conduit entry/exit locations, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.5 OPERATION AND MAINTENANCE DATA

- A. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.
- B. Maintenance Data: Include spare parts data listing; source and current prices of replacement parts and supplies; and recommended maintenance procedures and intervals.

1.6 QUALITY ASSURANCE

- A. Manufacturer to be ISO 9000, 9001, or 9002 certified.
- B. Perform Work in accordance with NECA Standard of Installation and manufacturer's written requirements.

1.7 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

PART 2 PRODUCTS

2.1 NOT USED

2.2 POWER PANELBOARDS

- A. Circuit Breaker Type:
 - 1. Circuit Breaker Panelboards: NEMA PB 1, 22,000 RMS symmetrical amperes minimum at 250 volts AC or 18,000 RMS symmetrical amperes minimum at 480 volts AC or as specified on the drawings. Equivalent to Square D I-Line.
- B. Service Conditions:
 - 1. Temperature: 104 degrees F, 40 degrees C.
 - 2. Altitude: 1000 feet.
- C. Panelboard Bus:
 - 1. Plated copper, ratings as indicated. The panelboard bussing shall be of sufficient cross-sectional area to meet UL Standard 891 temperature rise requirements.
 - 2. Provide ground bus in each panelboard.
 - 3. Provide neutral bus where required by the utilization voltage.
 - 4. Circuit breakers requiring intermediate bussing between the main vertical bus and the circuit breaker are not acceptable.

5. Main Lug Only Panels: UL listed for type and temperature rating of wire specified.
- D. Indoor Enclosure: NEMA PB 1, Type 1. Minimum cabinet box dimensions: 6 inches deep; 20 inches wide.
- E. Cabinet Front: Flush or surface type, hinged one-piece with door, fastened with concealed hardware and trim clamps. Provide concealed hinged door with flush lock. Finish in manufacturer's standard gray enamel.
- F. Nameplates:
 1. Manufacturer's nameplate, located on panel interior front, shall contain system information (such as but not limited to voltage and current ratings) and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and Short Circuit Current Rating including series rating. Series rating information shall be:
 - a. Size and type of upstream device.
 - b. Branch devices that can be used.
 - c. UL series short-circuit rating.
 2. Refer to specification section 26 05 53 for additional nameplate requirements.

2.3 BRANCH CIRCUIT PANELBOARDS

- A. Lighting and Appliance Branch Circuit Panelboards: NEMA PB1, circuit breaker type.
- B. Panelboard Bus:
 1. Plated copper, ratings as indicated.
 2. Provide ground bus in each panelboard.
 3. Provide split neutral bus where required by the utilization voltage. Neutral bus shall be located in the mains compartment for incoming neutral conductors to be the same length.
 4. Main Lug Only Panels: UL listed for type and temperature rating of wire specified.
- C. Minimum integrated short circuit rating for 240 volt panelboards: 10,000 amperes rms symmetrical at 240 volt. Equivalent to Square D NQOD.
- D. Minimum integrated short circuit rating for 480 volt panelboards: 14,000 amperes rms symmetrical at 480 volt. Equivalent to Square D NF.
- E. Interiors: Field convertible for top or bottom incoming feed. Main and sub-feed circuit breakers shall be vertically mounted, separate from branch circuit breakers. Interior leveling provisions for flush mounted applications. Interior trim shall be dead-front construction.
- F. Indoor Enclosure: NEMA PB 1, Type 1. Minimum cabinet box dimensions: 5 ¾ inches deep; 20 inches wide.

G. Cabinet Front: Flush or surface type, hinged one-piece with door, fastened with concealed hardware and trim clamps. Provide concealed hinged door with flush lock. Finish in manufacturer's standard gray enamel.

H. Nameplates:

1. Manufacturer's nameplate, located on panel interior front, shall contain system information (such as but not limited to voltage and current ratings) and catalog number or factory order number. Interior wiring diagram, neutral wiring diagram, UL Listed label and Short Circuit Current Rating including series rating. Series rating information shall be:

- a. Size and type of upstream device.
- b. Branch devices that can be used.
- c. UL series short-circuit rating.

2. Refer to specification section 26 05 53 for additional nameplate requirements.

2.4 OPTIONS AND ACCESSORIES

A. The accessories below apply to each panelboard or load center shown on the drawings.

1. OPTION 1: 200% Neutral Bus: 200% rated solid neutral. Bus shall be the same material as the main bus of the panelboard. Panelboard shall be marked for non-linear load.

2. OPTION 2: Isolated Ground Bus: Isolated and insulated from the panelboard enclosure. Bus shall be the same material as the main bus of the panelboard.

3. OPTION 3: Dual Main Lugs: Fully rated for ampere rating of the panelboard, conductor range centered on panelboard ampere rating.

4. OPTION 4: Feed Through Lugs: Fully rated for ampere rating of the panelboard, conductor range centered on panelboard ampere rating.

5. OPTION 5: Compression Lugs: Tool and die applied compression lugs.

PART 3 EXECUTION

3.1 DELIVERY AND STORAGE

A. Inspect and report concealed damage to carrier.

B. Handle carefully to avoid damage to panelboard internal components, enclosure and finish.

C. Store in a clean, dry location. Maintain factory packaging and, as required, provide additional heavy canvas or heavy plastic cover to protect panelboards from dirt, water construction debris and traffic.

3.2 INSTALLATION

A. Examine areas to receive panelboards to assure adequate working clearance for panelboard

1 installation.

2 B. Install panelboards in accordance with NEMA PB 1.1.

3 C. Install panelboards plumb. Install recessed panelboards flush with wall finishes. Provide
4 supports in accordance with Section 26 05 29.

5 D. Provide filler plates for unused spaces in panelboards.

6 E. Provide typed circuit directory for each panelboard. The use of adhesive applied directories
7 is not acceptable. The directory shall accurately indicate the types of devices served and
8 the rooms in which the devices are located. The rooms and panelboards shall be designated
9 by the actual name or number designated by the Owner. Revise directory to reflect
10 circuiting changes required to balance phase loads.

11 F. Provide engraved plastic nameplates under the provisions of Section 26 05 53.

12 G. Provide spare conduits out of each recessed panelboard to an accessible location above
13 ceiling. Minimum spare conduits: 3 empty 1 inch. Identify each as SPARE.

14 3.3 FIELD QUALITY CONTROL

15 A. Field inspection and testing will be performed under provisions of Section 26 08 11.

16 3.4 ADJUSTMENT AND CLEANING

17 A. Adjust doors and operating mechanisms for free mechanical movement.

18 B. Tighten lugs and bus connections.

19 C. Clean interior of panelboard.

20 D. Sand, prime and paint scratched or marred surfaces to match original finish.

21 END OF SECTION

SECTION 26 27 02

EQUIPMENT WIRING SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Electrical connections to equipment specified under other sections.

1.2 REFERENCES

- A. NEMA WD 1 - General Purpose Wiring Devices.
- B. NEMA WD 6 - Wiring Device Configurations.
- C. ANSI/NFPA 70 - National Electrical Code.

1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.4 COORDINATION

- A. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.
- D. Sequence electrical connections to coordinate with start-up schedule for equipment.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.2 GENERAL

- A. Make electrical connections in accordance with equipment manufacturer's instructions.

- B. Make conduit connections to equipment using flexible conduit. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.
- C. Provide receptacle outlet where connection with attachment plug is indicated.
- D. Unless otherwise indicated on drawings or in specifications, motors shall be furnished, set in place, and connected to driven equipment and prepared for operation as specified in other sections. Provide final connection and proper phase relationship to achieve proper motor rotation.
- E. Motor connections shall be made by compression type connectors using proper tools and fittings to assure good electrical continuity and low resistance joint.
- F. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Provide interconnecting conduit and wiring between devices and equipment where indicated.

3.3 DISCONNECT SWITCHES

- A. Provide all disconnect switches for loads as required by code.
- B. Review HVAC and Plumbing specifications to determine what equipment is furnished with disconnect switches.
- C. Install all disconnect switches whether furnished under this contract or not.
- D. It is the Electrical Contractors responsibility to determine the need for a disconnect switch requirements for each specific load and shall include in their bid all disconnect switches required whether indicated on the drawings or not.
- E. Do not directly attach disconnect switches to equipment where subject to vibration. Provide an individual support system as required.

3.4 MOTORS

- A. Motor starters shall be furnished by the Contractor supplying the motor requiring a starter.
- B. Furnish and install motor circuits in accordance with schedules on drawings and code requirements, from source of supply to associated motor starter, and from starter to motor terminal box, including necessary and required intermediate connections.
- C. Conductor and conduit size for motor branch circuits, if shown on drawings, are sized for motor requirement only. Contractor may, at his option, include associated control conductors in same conduit providing the conduit size is adjusted to meet code requirements for percentage of fill.
- D. Motors shall have proper feeders as per NEC and nameplate ratings. Contractor is responsible for verification of ratings of motors and installing proper branch circuits.

- 1 E. Provide an equipment grounding conductor within feeders where a variable frequency
2 drive is installed (VFD). This includes both the line and load side of the VFD.

3 3.5 COORDINATION WITH OTHER TRADES

- 4 A. Obtain manufacturer's wiring diagrams of electrical equipment furnished with equipment
5 and do not proceed to wire equipment without this information.

- 6 B. Check drawings and specifications of other divisions of work for equipment and work
7 which must be included (whether or not shown on electrical drawings) in order to provide
8 a complete electrical installation.

9 END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall switches.
- B. Wall dimmers.
- C. Receptacles.
- D. Wall plates.
- E. Floor boxes.

1.2 REFERENCES

- A. NECA - Standard of Installation.
- B. NEMA WD 1 - General Requirements for Wiring Devices.
- C. NEMA WD 6 - Wiring Device - Dimensional Requirements.
- D. NFPA 70 - National Electrical Code.

1.3 SUBMITTALS FOR REVIEW

- A. Product Data: Provide manufacturer's catalog information showing ratings, dimensions, colors, and configurations.

1.4 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Provide Products listed and classified by Underwriters Laboratories, Inc., and/or the testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.5 EXTRA MATERIALS

- A. Furnish two of each style, size, and finish wall plate.

PART 2 PRODUCTS

2.1 WIRING DEVICES

- A. Use of a manufacturer's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired only.

B. Acceptable Manufacturers:

1. Hubbell Wiring Devices.
2. Cooper Wiring Devices.
3. Pass and Seymour/Legrand.
4. Leviton

C. Provide wiring devices of one manufacturer.

D. Switches - Standard:

1. General Use Toggle Switches (20 amp type):

- a. Single Pole - Hubbell #1221 series.
- b. Double Pole - Hubbell #1222 series.
- c. Three Way - Hubbell #1223 series.
- d. Four Way - Hubbell #1224 series.
- e. Keylock switches - Add an "L" to catalog numbers above.
- f. Red Polycarbonate Toggle Single Pole - Hubbell #2332PL.
- g. Switches controlling normal source circuits shall be "ivory" in color.
- h. Switches controlling emergency source circuits shall be "red" in color.
- i. Provide key type switches where indicated on the drawings.
- j. Provide toggle switches with a "red" light lexan handle for switches utilized for controlling remote equipment. (See drawings for locations.)
Provide engraved nameplate identifying the load controlled.

2. Momentary Contact Switches:

- a. 15 amp type - Hubbell #1556.
- b. 20 amp type - Hubbell #1557.
- c. Switches controlling normal source circuits shall be "ivory" in color.
- d. Switches controlling emergency source circuits shall be "red" in color.
- e. Provide key type switches where indicated on the drawings.

E. Receptacles - Standard:

1. Specification grade receptacles. Equals to the listed specification grade receptacles must contain a one piece, all brass, mounting strap with integral ground contacts.

- a. 15 amp, 120V, NEMA 5-15R, duplex - Hubbell #5262 series.
- b. 20 amp, 120V, NEMA 5-20R, single - Hubbell #5361 series.
- c. 20 amp, 120V, NEMA 5-20R, duplex - Hubbell #5362 series.
- d. 15 amp, 120V, NEMA 5-15R, duplex, ground fault interrupter – Hubbell #GFR5252 series.
- e. 20 amp, 120V, NEMA 5-20R, duplex, ground fault interrupter – Hubbell #GFR5352 series.
- f. 15 amp, 120V, NEMA 5-15R, duplex, isolated ground - Hubbell #CR5252IG series.

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- g. 20 amp, 120V, NEMA 5-20R, duplex, isolated ground - Hubbell #CR5352IG series.
- h. 15 amp, 120V, NEMA 5-15R, duplex, hospital grade tamper resistant - Hubbell #HBL8200SG series.
- i. 20 amp, 120V, NEMA 5-20R, duplex, hospital grade tamper resistant - Hubbell #HBL8300SG series
- j. 15 amp, 120V, NEMA 5-15R, duplex, surge suppression – Hubbell #HBL5260S series.
- k. 20 amp, 120V, NEMA 5-15R, duplex, surge suppression – Hubbell #HBL5360S series.

- 2. All receptacles shall be grounding type.
- 3. All exterior receptacles shall be GFCI type.
- 4. All wet location receptacles shall be GFCI type.
- 5. Special purpose receptacles shall be either specification grade or hospital grade and shall have the characteristics as shown on the drawings.
- 6. 120 volt, 15 amp, duplex receptacles may only be utilized on 20 amp circuits where 3 or more receptacles are being served by one 20 amp circuit.
- 7. All receptacles served from the "normal" source shall have an "ivory" face. All receptacles served from the "emergency" source shall have an "red" face.

2.2 WALL DIMMERS

A. Provide Lutron Corporation Nova T-Star series wall box dimmers at locations indicated on the drawings. Equal wall box dimmers manufactured by Leviton are acceptable.

B. Incandescent

- 1. Incandescent wall box dimmers shall be sized as follows:
 - a. 0W-600W - Lutron #NT-600.
 - b. 601W-1000W - Lutron #NT-1000.
 - c. 1001W-1501W - Lutron #NT-1500.
 - d. 1501W-2000W - Lutron #NT-2000.
- 2. Three and four way incandescent dimming – Dimmer/Switch combinations.
 - a. This system provides dimming and on/off controls at one location and on/off control only at all other locations. Provide this system when a three way dimmer is shown controlling the same group of fixtures as three and four way switches. This shall consist of a base unit and three and four way switches as indicated in the switch section above. The dimmer component shall be:
 - 1). 600W base unit - Lutron #NT-603P.
 - 2). 1000W base unit - Lutron #NT-1003P.
 - 3). 1500W base unit - Lutron #NT-1503P.

- 4). 2000W base unit - Lutron #NT-2003P.
 3. Three and four way incandescent dimming – Dimmer/Dimmer combinations.
 - a. This system provides dimming and on/off controls in all locations. Provide this system when a multiple dimmers are shown controlling the same group of fixtures. This system does not contain any three or four way switches indicated in the switch section above. This shall consist of one master unit, and the remainder of the devices being remote units.
 - 1). 600W master unit – Lutron #MA-600
 - 2). 1000W master unit – Lutron #MA-1000
 - 3). Remote units (all wattages) – Lutron #MA-R
 - b. For dimming a group of fixtures exceeding 1000W, reference section “F” below.
 - C. Electronic Low Voltage Dimmers.
 1. 0W-450W - Lutron #NELV-450.
 - D. Dimming applications of greater than 2000 watts.
 1. Utilize the Lutron Hi-Power 2/4/6 Dimming modules
 - a. 50W through 2000W - Lutron HP-2
 - b. 100W through 4000W - Lutron HP-4
 - c. 150W through 6000W - Lutron HP-6
 2. Control Hi-Power 2/4/6 dimming modules with incandescent dimmer #N-600 or the three way equivalent.
 3. The Hi-Power 2/4/6 dimming modules are capable of controlling the following sources:
 - a. Incandescent.
 - b. Magnetic Low Voltage.
 - c. Electronic Low Voltage.
 - d. Fluorescent Electronic Dimming ballasts.
 - e. Neon/Cold Cathode.
 - E. Wall box dimmers shall be ganged where possible in accordance with the manufacturer's derating factors.
 - F. Wall box dimmers controlling lighting served from an “emergency” source shall have a red face. If the dimmer is not available with a red face, provide an alternate means of identifying the dimmer is controlling an “emergency” circuit. The alternate means shall be approved by the Architect/Engineer.
- 2.3 WALL PLATES
- A. Flush Mounted Device Cover Plates: High impact smooth nylon.

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B. Surface Mounted Device Cover Plates: 1/2 inch raised galvanized steel covers with a minimum of two screws mounting the wiring device to the coverplate.

C. Weatherproof Cover Plate:

1. New Construction:

a. Vertical Mount: Gasketed, molded high impact, UV stabilized polycarbonate resin with hinged gasketed device cover, TayMac Corp. #72204. Assembly shall be rainproof while in use. Color as selected by Architect from manufacturer's standard colors.

D. All wall plates covering receptacle circuits shall have the plate marked, in a neat, concise manner, with the panel and circuit number. Utilize a permanent marking system. Handwritten identification will not be accepted.

2.4 FLOOR BOXES

A. Acceptable Manufacturers

1. Steel City/Thomas & Betts.

2. Hubbell.

3. Walker/Wiremold.

B. Floor Box Types

1. Type A: ANSI/NEMA OS 1, fully adjustable, Steel City 640 Series.

a. Material: Cast metal.

b. Shape: Rectangular.

c. Accessories: Cover plates and carpet plates shall be polished brass or brushed aluminum as selected by Architect.

d. Conform to regulatory requirements for concrete-tight floor boxes.

2. Type B: ANSI/NEMA OS 1, fully adjustable, Steel City 664 series.

a. Material: Cast metal.

b. Shape: Rectangular.

c. Accessories: Architect shall select cover plates and carpet plates from manufacturer's standard colors.

d. Accessories: Provide power and data plates for the type and quantity of devices as indicated on the drawings.

e. Conform to regulatory requirements for concrete-tight floor boxes.

3. Type C: Steel City #GAB-4 with base inset #AFM-4. Color as selected by Architect.

a. Accessories: Provide power and data plates for the type and quantity of devices as indicated on the drawings.

4. Type D: Steel City #600 series with P-60-3/4-2-CACP polished brass carpet plate for use as a power OR data furniture feed.
 - a. Material: Cast Iron
 - b. Shape: Circular
 - c. Conform to regulatory requirements for concrete-tight floor boxes.
 - d. Available conduit tapping (provide appropriate tapping for conduit as indicated on the floor plans for LV cable installation or required by NEC for power installations):
 - 1). 600-SC, 3/4"
 - 2). 601-SC, 1"
 - 3). 601 1/4-SC, 1-1/4"
 - 4). 602-SC, 2"
5. Type H1: High capacity floor box. Wiremold RFB9 series with standard carpet/tile/wood flooring top plate for use where high capacity power, data, and communications (network, video, signal) are required. 9 total gangs of capacity.
 - a. Material: Steel
 - b. Shape: Rectangular
 - c. Provide with slab-on-grade fusion bonded epoxy corrosion resistant paint finish.
 - d. Compartments contained:
 - 1). One six gang compartment
 - 2). Three single gang compartments
 - e. Knockouts available between 3/4" and 1-1/4"
 - f. Provide standard faceplates to accommodate each accessory installed. Options include:
 - 1). Blank device plates. RFB1190B series plates.
 - 2). GFI receptacle plates. RFB119-GFI series plates.
 - 3). Duplex receptacle plates. RFB119-D series plates.
 - 4). Single receptacle plates. RFB119-SR series plates
 - 5). Knock-out plates. RFB-119-KO series plates.
 - 6). Wiremold communications device plates. RFB-119AB series plates
 - 7). Ortronics Track Jack communication device plates. RFB-119RT series plates.
 - 8). Microphone device plates. RFB-119-XLR series plates.
 - 9). Spacer plates. RFB119-Spacer series plates.
6. Type H2: High capacity floor box. Wiremold RFB11 series with standard carpet/tile/wood flooring top plate for use where high capacity power, data, and communications (network, video, signal) are required. 11 total gangs of capacity.
 - a. Material: Steel
 - b. Shape: Rectangular
 - c. Provide with slab-on-grade fusion bonded epoxy corrosion resistant paint finish.
 - d. Compartments contained:
 - 1). One six gang compartment
 - 2). Two single gang compartments

- 3). One three gang compartment
- e. Knockouts available between $\frac{3}{4}$ " and 2"
- f. Provide standard faceplates to accommodate each accessory installed.
Options include:
 - 1). Blank device plates. RFB1190B series plates.
 - 2). GFI receptacle plates. RFB119-GFI series plates.
 - 3). Duplex receptacle plates. RFB119-D series plates.
 - 4). Single receptacle plates. RFB119-SR series plates
 - 5). Knock-out plates. RFB-119-KO series plates.
 - 6). Wiremold communications device plates. RFB-119AB series plates
 - 7). Ortronics Track Jack communication device plates. RFB-119RT series plates.
 - 8). Microphone device plates. RFB-119-XLR series plates.
 - 9). Spacer plates. RFB119-Spacer series plates.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to beginning work.
- B. Verify that outlet boxes are installed at proper height.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that floor boxes are adjusted properly.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean debris from outlet boxes.

3.3 INSTALLATION

- A. Install in accordance with NECA "Standard of Installation."
- B. Install devices plumb and level.
- C. Install switches with OFF position down.
- D. Install vertically mounted receptacles with grounding pole on top, horizontally mounted receptacles with grounding pole on left.
- E. Do not use terminals on wiring devices (hot, neutral or ground) for feed-through connections, looped or otherwise. Make circuit connections via wire connectors and pigtails. All conductors utilized for pigtail connections shall be solid conductors. Do not terminate stranded conductors to any wiring device.

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- F. Ground receptacles with an insulated green grounding conductor from the device ground screw to a pigtail connection. The pigtail connection shall also be electrically connected to the grounding conductor attached to the metallic box and the grounding conductor from the serving panel if provided.
- G. Connect wiring devices by wrapping conductor around screw terminal.
- H. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
- I. Use jumbo size plates for outlets installed in masonry walls.
- J. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.
- K. Install gasket plates for devices or system components having light emitting features, such as switches with pilot lights. Where installed on rough textured surfaces, seal plates with black self-adhesive poly-foam.
- L. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer or as outlined within this specification, whichever is more stringent.
- M. Do not share neutral conductor on load side of dimmers.
- N. All toggle switches controlling lighting, equipment and etc. served from an isolated power system shall be 2-pole devices.

3.4 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Operate each wall switch with circuit energized and verify proper operation.
- C. Verify that each receptacle device is energized.
- D. For testing of wiring of receptacles refer to specification section 26 08 11.

3.5 ADJUSTING

- 10 A. Adjust devices and wall plates to be flush and level. 11

3.6 CLEANING

- A. Clean exposed surfaces to remove splatters and restore finish.

END OF SECTION

SECTION 26 27 28

DISCONNECT SWITCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Disconnect switches.
- B. Enclosures.

1.2 REFERENCES

- A. ANSI/UL 198C - High-Intensity Capacity Fuses; Current Limiting Types.
- B. ANSI/UL 198E - Class R Fuses.
- C. ANSI/NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches.
- D. UL 98 – Enclosed and Dead Front Switches.

1.3 EQUIPMENT DIMENSIONS

- A. Refer to floor plan drawings for approximate overall dimensions for the equipment of this section. Minor dimensional increases of 6 inches or less are acceptable, unless specific dimensions are indicated for the equipment. Notify the engineer in writing 5 days prior to submitting bid if the dimensional increases will be greater than 6 inches in any dimension.

1.4 SUBMITTALS

- A. Product Data: Provide outline dimensions of enclosures and accessories, electrical ratings and fuse sizes.

1.5 OPERATION AND MAINTENANCE DATA

- A. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Square D.
- B. General Electric.
- C. Siemens.
- D. Cutler Hammer.

2.2 DISCONNECT SWITCHES

- A. Fusible Switch Assemblies: NEMA KS 1; Type HD; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position. Fuse Clips: Designed to accommodate Class R fuses.
- B. Nonfusible Switch Assemblies: NEMA KS 1; Type HD; quick-make, quick-break, load interrupter enclosed knife switch with externally operable handle interlocked to prevent opening front cover with switch in ON position. Handle lockable in OFF position.
- C. Interrupting rating of 100,000 RMS symmetrical amps at 600 VAC.
- D. Enclosures:
 - 1. Indoor: NEMA KS 1; Type 1; code gauge steel with rust inhibiting primer.
 - 2. Outdoor: NEMA KS 1; Type 3R; code gauge zinc coated steel with baked enamel finish or Type 4 when indicated on the drawings.
 - 3. Corrosive Areas: NEMA KS 1; Type 4X; 304 stainless steel with brushed finish.
 - 4. Hazardous Areas: NEMA KS 1; Type 7/9; copper free, aluminum alloy.

2.3 FUSES

- A. Refer to specification section 26 28 14.

PART 3 EXECUTION

3.1 DELIVERY AND STORAGE

- A. Inspect and report concealed damage to carrier.
- B. Handle carefully to avoid damage to disconnect switch internal components, enclosure and finish.
- C. Store in a clean, dry location. Maintain factory packaging and, as required, provide additional heavy canvas or heavy plastic cover to protect disconnect switches from dirt, water construction debris and traffic.

3.2 INSTALLATION

- A. Install disconnect switches where indicated, in accordance with manufacturer's instructions.
- B. Install disconnect switches plumb. Provide supports in accordance with Section 26 05 29. Do not directly attach disconnect switches to equipment subject to vibration.
- C. Install fuses in fusible disconnect switches.
- D. Provide engraved plastic nameplates under the provisions of Section 26 05 53.

3.3 ADJUSTMENT AND CLEANING

- A. Adjust doors and operating mechanisms for free mechanical movement.
- B. Verify fuse size will provide proper operation and compliance with NEC.
- C. Tighten lugs and bus connections.
- D. Clean interior of disconnect switches.
- E. Sand, prime and paint scratched or marred surfaces to match original finish.

END OF SECTION

SECTION 26 28 14

OVERCURRENT PROTECTIVE DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Circuit breakers.
- B. Enclosed circuit breakers.

1.2 REFERENCES

- A. NECA (National Electrical Contractors Association) "Standard of Installation."
- B. NEMA AB 1 - Molded Case Circuit Breakers
- C. NFPA 70 - National Electrical Code.
- D. NEMA FU 1 - Low Voltage Cartridge Fuses.
- E. UL 50 – Enclosures for Electrical Equipment.
- F. UL 489 – Molded-Case Circuit Breakers and Circuit Breaker Enclosures.
- G. UL 1699 – Standard for Safety Arc-Fault Circuit Interrupters.

1.3 SUBMITTALS

- A. Product Data: Provide catalog sheets showing ratings, trip units, time current curves, dimensions, and enclosure details.

1.4 OPERATION AND MAINTENANCE DATA

- A. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with NECA Standard of Installation.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed and classified by UL as suitable for purpose specified and indicated.

PART 2 PRODUCTS

2.1 SHORT CIRCUIT RATINGS

- A. The panels and switchboards indicated on the one-line diagram shall be protected by circuit breakers which are fully rated to provide an AIC rating greater than or equal to rating indicated. The series rating method is not acceptable.

2.2 CIRCUIT BREAKERS

A. Acceptable Manufacturers

1. Square D.
2. General Electric.
3. Siemens.
4. Cutler Hammer.

B. Branch Circuit Panel Circuit Breakers:

1. Molded case type with thermal and magnetic trip elements in each pole.
2. Single-handle common trip, two and three poles (handle ties not acceptable).
3. Ground fault protection for personnel (5 mA) when indicated on the drawings.
4. Ground fault protection for equipment (30 mA) when indicated on the drawings.
5. Bolt-on type.
6. Quick make and break toggle over center action.
7. Handle trip indication.
8. Handle position indication, ON in up position, OFF in down position, and TRIPPED centered.
9. UL listed for type and temperature rating of wire specified and in accordance with UL Standard 489.
10. UL listed short circuit rating (integrated equipment rating): Up to 240V: 10,000 RMS symmetrical amperes minimum. Up to 480V: 14,000 RMS symmetrical amperes minimum.
11. UL SWD switching duty on 120V or 277V circuits where loads are panel switched.
12. UL listed for use with the factory installed accessories listed below.
13. Manufacturer of the circuit/breaker shall be the same as the manufacturer of the panelboard, switchboard, MCC, substation in which it will be mounted in.

2.3 CIRCUIT BREAKER TYPES

A. TYPE MC - Molded Case Circuit Breakers:

1. Construction: Molded case type with permanent trip unit with thermal and magnetic trip elements in each pole.
2. Single magnetic trip adjustment for breakers with a frame size greater than 100 amperes.
3. Single-handle common trip, two and three poles (handle ties not acceptable).
4. Push-to-trip test button.
5. Plug-on to bus and bolt-on to mounting strap.
6. Quick make and break over center toggle action.
7. Handle trip indication.
8. Shall meet the following standard:
 - a. UL
 - b. CSA
 - c. IEC 157-1
 - d. NEMA Standard AB1-1975
 - e. Fed Spec W-C-375B/GEN
9. Handle position indication, ON in up position, OFF in down position, and TRIPPED centered.
10. UL listed for type and temperature rating of wire specified.
11. Manufacturer of the circuit breaker shall be the same as the manufacturer of the panelboard, switchboard, MCC, substation in which it will be mounted.
12. Options and Accessories:
 - a. Refer to Drawings for exact configuration of options and accessories required for individual circuit breakers.
 - b. The following is a list of accessories available for a molded case circuit breaker. Refer to Section 2.4 for item code definitions.
 - 1). ALS – Alarm Switch
 - 2). AXS – Auxiliary Switch
 - 3). EOP – Electric Operator
 - 4). STR – Shunt Trip
 - 5). UVT – Under Voltage Trip
 - c. The following is a list of options available for a molded case circuit breaker. Refer to Section 2.5 for item code definitions.
 - 1). AF – Arc Fault Circuit Interrupter
 - 2). CL – Current Limiting

- 3). GE – Ground Fault Protection - Equipment
- 4). GP – Ground Fault Protection - Personnel
- 5). GS – Ground Fault Sensing
- 6). HC – HACR Rating
- 7). HM – High Magnetic
- 8). MS – Molded Case Switch
- 9). MP – Motor Circuit Protector

B. TYPE SS - Solid State Molded Case Circuit Breaker:

1. Circuit breakers shall be solid state trip units as specified on the drawings or elsewhere in this specification. Circuit breakers shall be true RMS type. Interrupting rating shall be greater than the value shown on the drawings. All circuit breakers shall be constructed in accordance with UL Standard 489 and NEMA Standard AB1-1975 and shall meet the requirements of Federal Specification W-C- 375B/GEN as Class 25a and IEC 157-1. The circuit breakers shall be rated for continuous duty unless otherwise indicated. The ampere rating shall be determined by the interchangeable rating plug. Breakers shall be provided with ampere frames, ampere sensors, ampere rating plugs as noted on the one line drawings. Breakers shall have an integral LCD ammeter and trip indicator. The indicator shall display the cause of a tripping occurrence such as short circuit overcurrent or ground fault. No external power source shall be required for this trip indicator.
2. Construction: Circuit breakers shall be constructed using glass reinforced insulating material providing high dielectric strength. The circuit breakers shall have quick-make, quick-break contacts with an over center operating mechanism. Current carrying components shall be isolated from the trip unit and field installed accessories. Breakers shall provide common tripping of all poles and shall be trip free. The integral trip unit shall be independent of any external power source and shall contain reliable electronic components to measure and time the output from internal current sensors and initiate tripping action. The circuit breaker shall be UL listed for reverse connection without requiring special construction.
3. Circuit breakers shall be provided with seals for locking the rating plug and adjustments to prevent unauthorized changes.
4. UL listed for type and temperature rating of wire specified.
5. Manufacturer of the circuit breaker shall be the same as the manufacturer of the panelboard, switchboard, MCC, substation in which it will be mounted.
6. Options and Accessories:
 - a. Refer to Drawings for exact configuration of options and accessories required for individual circuit breakers.
 - b. The following is a list of accessories available for a solid state molded case circuit breaker. Refer to Section 2.4 for item code definitions.
 - 1). ALS – Alarm Switch
 - 2). AXS – Auxiliary Switch
 - 3). EOP – Electric Operator

- 4). STR – Shunt Trip
- 5). UVT – Under Voltage Trip
- c. The following is a list of options available for a solid state molded case circuit breaker. Refer to Section 2.5 for item code definitions.
 - 1). AF – Arc Fault Circuit Interrupter
 - 2). L1 – Long time / Instantaneous (LI)
 - 3). L2 – Long time / Short time / Instantaneous (LSI)
 - 4). L3 – Long time / Short time / Instantaneous / Ground Fault Trip (LSIG)
 - 5). L4 – Long time / Short time / Instantaneous / Ground Fault Sensing (LSIA)
 - 6). MP – Motor Circuit Protector
 - 7). SC – System Communication
 - 8). SD – System Diagnostic
 - 9). SM – System Monitoring
 - 10). ZS – Zone Selective Interlocking
 - 11). 100 – 100% Rated Circuit Breaker

CIRCUIT BREAKER ACCESSORIES

A. ACCESSORY ALS:

1. Alarm Switch: One set of normally open and one set of normally closed contacts rated 120 volt 5 amps. Contact activation upon any trip function of the circuit breaker or external trip device, such as a shunt trip.

B. ACCESSORY AXS:

1. Auxiliary Switch: One set of normally open and one set of normally closed contacts rated 120 volt 5 amps. Contacts signal the status of circuit breaker main contacts independent of the method used to open or close the circuit breaker.

C. ACCESSORY EOP:

1. Electrical Operator: Device for remote On, Off and Reset control of circuit breaker from a remote device. Field verify operator voltage.

D. ACCESSORY STR:

1. Shunt Trip: Electrically operated solenoid for remote opening of circuit breaker main contacts. Field verify coil voltage.

E. ACCESSORY UVT:

1. Undervoltage Trip: Electrically operated solenoid for opening of circuit breaker main contacts when control voltage drops below 35 to 70% of rated system voltage. Field verify coil voltage.

CIRCUIT BREAKER OPTIONS

A. OPTION AF:

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1. Arc Fault Circuit Interrupter:

- a. Circuit breaker shall be provided with integral arc flash protection for grounded systems.

B. OPTION AR:

1. Arc Flash Reduction:

- a. Circuit breaker shall have a maintenance mode for arc flash reduction.
- b. Maintenance mode shall have adjustable arc flash reduction settings.

C. OPTION CL:

1. Current Limiting: Interrupting rating of 100,000 RMS symmetrical amperes.

2. Meet the following standards:

- a. CSA listed
- b. IEC 157-1
- c. NEMA AB1-1975
- d. Fed Spec W-C-375B/GEN

3. Thermal and magnetic molded case type with ultra high speed blow apart contacts.

4. Ground fault protection when indicated on the drawings:

- a. Circuit breakers shall be provided with integral equipment protection for grounded systems.
- b. The ground fault system shall be residual type.
- c. The system shall have adjustable time delay and pick-up settings.

5. Single-handle common trip, two and three poles (handle ties not acceptable).

6. Quick make and break toggle over center action.

7. Handle trip indication.

8. Handle position indication, ON in up position, OFF in down position, and TRIPPED centered.

9. On high level fault currents, the circuit breaker shall limit peak current and let-thru energy and provide a voltage transient-free interruption at near unity power factor. On fault currents below the threshold of limitation, the circuit breaker shall provide conventional overload and short circuit protection.

10. Combinations for series connected interrupting ratings shall be recognized by Underwriters Laboratories. Current limiting circuit breakers shall allow the use of branch circuit breakers with lower interrupting capacities on systems capable of delivering fault currents up to 200,000 rms symmetrical amperes at 480V AC.

11. Manufacturer of the circuit breaker shall be the same as the manufacturer of the

panelboard, switchboard, MCC, substation in which it will be mounted.

D. OPTION GE:

1. Ground Fault Protection - Equipment:

- a. Ground fault protection for equipment equal to 30 mA.
- b. Circuit breaker shall be provided with integral equipment protection for grounded systems.
- c. The ground fault system shall be residual type.
- d. The system shall have adjustable time delay and pick-up settings.

E. OPTION GP:

1. Ground Fault Protection - Personnel:

- a. Ground fault protection for personnel equal to 5 mA.
- b. Circuit breaker shall be provided with integral equipment protection for grounded systems.
- c. The ground fault system shall be residual type.
- d. The system shall have adjustable time delay and pick-up settings.

F. OPTION GS:

1. Ground Fault Sensing / Alarm:

- a. Circuit breaker shall be provided with integral equipment ground fault alarm contact only for grounded systems.
- b. The circuit breaker shall have adjustable ground-fault pickup and ground-fault delay settings.

G. OPTION HC:

1. Heating , Air Conditioning, Cooling, Refrigeration - HACR:

- a. Circuit breaker shall be provided with HACR rating.

H. OPTION HM:

1. High Magnetic - HID:

- a. Circuit breaker shall be provided with high inrush current limit.

I. OPTION L1:

1. Long-Time / Instantaneous Protection - LI:

- a. Circuit breaker shall be provided with integral long-time and instantaneous protection for grounded systems.
- b. The circuit breaker shall have adjustable long-time pickup, long-time delay and instantaneous settings.

J. OPTION L2:

1. Long Time / Short Time / Instantaneous - LSI:

- a. Circuit breaker shall be provided with integral long-time, short-time and instantaneous protection for grounded systems.
- b. The circuit breaker shall have adjustable long-time pickup, long-time delay, short-time pickup, short-time delay and instantaneous settings.

K. OPTION L3:

1. Long Time / Short Time / Instantaneous / Ground Fault Trip - LSIG: .

- a. Circuit breaker shall be provided with integral long-time, short-time, instantaneous, and equipment ground fault protection for grounded systems.
- b. The circuit breaker shall have adjustable long-time pickup, long-time delay, short-time pickup, short-time delay, instantaneous, ground-fault pickup and ground-fault delay settings.

L. OPTION L4:

1. Long Time / Short Time / Instantaneous / Ground Fault Sensing - LSIA: .

- a. Circuit breaker shall be provided with integral long-time, short-time, instantaneous, and equipment ground fault alarm contact only for grounded systems.
- b. The circuit breaker shall have adjustable long-time pickup, long-time delay, short-time pickup, short-time delay, instantaneous, ground-fault pickup and ground-fault delay settings.

M. OPTION MP:

1. Motor Circuit Protector:

- a. Motor circuit protector shall be provided with magnetic protection only.
- b. The protector shall have adjustable instantaneous-trip settings.

N. OPTION MS:

1. Molded Case Switch:

- a. Molded case switch shall be provided with fixed instantaneous-trip only.

O. OPTION SC:

1. System Communication:

- a. Circuit breaker shall be provided with capability for metering integration of device into a Building Automation System (BAS).

P. OPTION SD:

1. System Diagnostic:

- a. Circuit breaker shall be provided with capability for advanced system diagnostics including power quality measurements and wave form analysis.

Q. OPTION SM:

1. System Monitoring:

- a. Circuit breaker shall be provided with capability for basic metering and data logging including current, voltage, power, energy and frequency.

R. OPTION ZS:

1. Zone Selective Interlocking:

- a. Circuit breaker shall have communications capabilities on trip functions compatible with all other electronic trip circuit breakers.

2.4 ENCLOSURE

A. Enclosure: NEMA AB 1, Type 1.

B. Fabricate enclosure from sheet steel which conforms to UL 50 including padlocking provisions for the OFF position.

C. Finish using manufacturer's standard enamel finish, gray color.

PART 3 EXECUTION

3.1 DELIVERY AND STORAGE

A. Inspect and report concealed damage to carrier.

B. Handle carefully to avoid damage to circuit breakers, internal components, enclosure and finish.

C. Store in a clean, dry location. Maintain factory packaging and, as required, provide additional heavy canvas or heavy plastic cover to protect equipment from dirt, water construction debris and traffic.

3.2 INSTALLATION

A. Install enclosed circuit breakers where indicated, in accordance with manufacturer's instructions.

B. Install enclosed circuit breakers plumb. Provide supports in accordance with Section 26 05 29.

C. Provide engraved plastic nameplates under the provisions of Section 26 05 53.

3.3 FIELD QUALITY CONTROL

- A. Field testing will be performed under provisions of Section 26 08 11.
- B. Inspect and test each circuit breaker to NEMA AB 1.
- C. Inspect each circuit breaker visually.
- D. Perform five (5) mechanical ON-OFF operations on each circuit breaker.
- E. Verify circuit continuity on each pole in closed position.
- F. Determine that circuit breaker will trip on overcurrent condition, with tripping time to NEMA AB 1 requirements.
- G. Include description of testing and results in test report.
- H. Test and/or permanently record the following:
 - 1. Circuit Breakers:
 - a. Nameplate data.
 - b. Actual trip setting.

3.4 ADJUSTING AND CLEANING

- A. Adjust trip settings Short Circuit and Coordination Study or as directed by the Engineer. Install seals on all rating plugs and adjustments after trip settings have been adjusted.
- B. Adjust doors and operating mechanisms for free mechanical movement.
- C. Tighten lugs and bus connections.
- D. Clean circuit breakers.
- E. Sand, prime and paint scratched or marred surfaces to match original finish.

END OF SECTION

SECTION 26 43 13

TRANSIENT-VOLTAGE SUPPRESSION FOR LOW-VOLTAGE POWER CIRCUITS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Individually mounted transient voltage surge suppressor.
- B. See section 26 24 18 for additional information regarding electronic grade panelboards.

1.2 REFERENCES

- A. ANSI/IEEE C62.11 - Standard for Metal-Oxide Surge Arresters for AC Power Circuits.
- B. ANSI/IEEE C62.41 - Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits, Category A, B, and C Environments.
- C. ANSI/IEEE C62.45 - Guide on Surge Testing for Equipment Connected to Low-Voltage AC Power Circuits.
- D. NEMA - LS-1, latest edition
- E. NFPA 70 - National Electrical Code.
- F. Underwriters' Laboratories, Inc. Standard UL 1283.
- G. Underwriters' Laboratories, Inc. Standard UL 1449.
- H. See the transient voltage surge suppression schedule on the drawing for specific features required for this project

1.3 SUBMITTALS

- A. Shop Drawings: Electrical and mechanical drawings shall be provided by the manufacturer which show unit dimensions, weights, component and connection locations, mounting provisions, connection details and wiring diagram.
- B. Product Data: Provide electrical characteristics and connection requirements, standard model design tests, and options.
- C. Submit manufacturer's installation instructions.
- D. Test Reports:
 - 1. Documentation of specified system's UL 1449 Listing and clamping voltage ratings of all protection modes shall be included as required product data submittal information.
 - 2. Documentation of the specified system's UL 1283 Complimentary Listing shall be included as required product data submittal information.

3. Submit test report data clearly demonstrating the maximum surge current rating has been tested on a COMPLETE TVSS unit including all necessary fusing/overcurrent protection, thermal disconnects, integral disconnects and monitoring systems. Manufacturers who cannot provide this data will not be approved.

4. Submit data demonstrating that the TVSS unit is capable of surviving the specified minimum repetitive surge current rating. The rating is based on surviving a specified number of ANSI/IEEE C62.41, Category C3 (10kA) impulses without failure or degradation in performance characteristics of more than 10%.

5. Independent fuse coordination tests from a nationally recognized independent testing laboratory.

6. Provide a COMPLETE data and test package per the requirements of NEMA LS1 – 1992.

E. Maintenance Data: Include maintenance instructions for cleaning methods; cleaning materials recommended; component replacement, testing and adjustment.

1.4 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years experience.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of NFPA 70.

B. Provide products listed and classified by Underwriters Laboratories and/or the testing firm acceptable to the authority having jurisdiction as suitable for the purpose specified and indicated.

1.6 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. No substitutions.

B. Acceptable Manufacturers:

1. Current Technology.

2. Liebert.

3. Square-D

4. Cutler Hammer

5. Siemens

6. GE

2.2 TRANSIENT VOLTAGE SURGE SUPPRESSOR - GENERAL REQUIREMENTS

A. All transient voltage surge suppressors shall meet the following specifications:

1. Surge suppressor shall have a UL1449 Listed suppression rating for each L-N, L-G and N-G mode of protection, shall be no greater than:

a. 480/277 volt 3 phase, "wye" - 700 volts.

b. 120/208 volt 3 phase, "wye" - 400 volts.

c. 480 volt 3 phase delta - 1500 volts.

2. Suppression device shall provide protection in all modes. Ten modes for "wye" systems L-L, L-N, L-G, and N-G and six modes for "delta" systems L-L and L-G.

3. The unit shall include a UL1283 high-frequency filter for noise filtering between 100 KHz and 100 MHz. The filter shall provide a minimum insertion loss ratio of 50-1 or 34 dB over the entire range.

4. Minimum continuous operating voltage of any component shall not be less than 115% of nominal operating voltage.

5. Unit shall include externally mounted LED visual status indicators that show the on-line status of each phase.

6. The unit shall be mounted in a metal enclosure NEMA rated for the location in which it is installed.

7. The primary suppression path shall be line to neutral.

8. TVSS devices designed with replaceable modules shall be furnished with one full set of spare modules to maintain system integrity.

2.3 TRANSIENT VOLTAGE SURGE SUPPRESSOR - SERVICE ENTRANCE APPLICATIONS

A. Minimum Single Pulse Surge Current Capacity shall be based on ANSI/IEEE C62.41-1991's standard 8 x 20 microsecond current waveform. The minimum surge current capacity, in amps, of the unit shall be no less than as follows:

1. 125,000 amps, L-N

2. 125,000 amps, L-G

3. 125,000 amps, N-G

4. 125,000 amps, L-L

B. The device shall be capable of surviving at least 10,000 ANSI/IEEE Category C3 (10kA) impulses without failure or performance degradation of more than 10%.

C. All transient voltage surge suppressors shall meet the general requirements indicated above.

D. Surge suppressor shall be Current Technology TG125 Series or Liebert LM125 Series.

2.4 TRANSIENT VOLTAGE SURGE SUPPRESSOR - BRANCH PANEL APPLICATIONS

A. Minimum Single Pulse Surge Current Capacity shall be based on ANSI/IEEE C62.41-1991's standard 8 x 20 microsecond current waveform. The minimum surge current capacity, in amps, of the unit shall be no less than as follows:

1. 80,000 amps, L-N

2. 80,000 amps, L-G

3. 80,000 amps, N-G

4. 80,000 amps, L-L

B. All transient voltage surge suppressors shall meet the general requirements indicated above.

C. The device shall be capable of surviving at least 10,000 ANSI/IEEE Category C3 (10kA) impulses without failure or performance degradation of more than 10%.

D. Surge suppressor shall be Current Technology TG80 Series or Liebert LM80 Series.

2.5 TRANSIENT VOLTAGE SURGE SUPPRESSORS - OPTIONS AND ACCESSORIES

A. The accessories below apply to each transient voltage surge suppressor as indicated on the transient and voltage surge suppressor schedule shown on the drawings.

1. OPTION 01: Unit Status Indicators: Red and green solid state indicators with printed labels shall be provided on the hinged front cover to repeatedly indicate unit module status. The absence of the green light and the presence of the red light shall reliably indicate that one or more surge current diversion modules has failed and that service is needed to restore full operation. Additionally, a electrically isolate Form C (one N.O. and one N.C.) summary alarm contact rated for at least 120 VAC and 1 ampere shall be provided for remote annunciation of unit status. The summary alarm contact shall change state if any one or more of the surge current diversion modules has failed.

2. OPTION 02: Audible Alarm: The specified system shall be equipped with an audible alarm which shall be activated when any one or more of the surge current diversion modules has failed. In conjunction with the audible alarm, an alarm on, off switch shall be provided to silence the alarm and an alarm push-to-test switch shall be provided to test the alarm function. Both switches and the audible alarm shall be located on the unit's hinged front cover.

3. OPTION 03: Transient Counter: A transient voltage surge counter shall be included to totalize transient voltage surge which deviate from the sine wave

envelope by more than 125 volts. The readout shall be at least a six digit LCD located on the unit's hinged front cover. The counter shall be equipped with a battery back-up to retain memory when power is not present. A push-button switch on the display's faceplate shall be provided for manual counter reset.

4. OPTION 04: A Remote Monitor Panel: A self-contained, UL listed, monitoring panel shall be available to allow remote annunciation of the system status. Input power to the monitoring panel shall be equipped with a 6 foot long input power cord with a NEMA 5-15 plug. The monitor panel shall have an audible alarm, red and green LED's, an alarm on/off switch to silence, and a push-to-test alarm switch. The monitor panel shall connect to a specified surge suppression system by way of a two wire control cable. Under normal operation the green LED shall be illuminated. Upon correction of module failure, the monitor panel shall automatically reset to normal mode. The panel shall be a non conductive enclosure.
5. OPTION 05: Service Disconnect Switch: The specified system shall include a circuit breaker or disconnect switch with fuses located in-line with the TVSS system enclosure with an external manual operator. The switch shall disconnect all ungrounded circuit conductors from the high energy surge current diversion modules. The switch shall be rated for 600 VAC and 30 amps (minimum) continuous. Wiring terminations shall be provided for at least #8 AWG.
6. OPTION 06: Summary Alarm Relay Contacts: The unit shall be equipped with a summary alarm relay with one set of Normally Open and Normally Closed (Form C) dry contacts rated for 125 VAC, 1 Amp (minimum). The contacts will change state and indicate a failure of the unit, a phase loss condition or a full power loss condition.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive surge suppressor equipment to assure adequate working clearance for equipment installation.

3.2 DELIVERY, STORAGE, AND HANDLING

- A. Section 01600 – Material and Equipment: Transport, handle, store, and protect products.
- B. Accept surge suppressor equipment on site. Inspect for damage.
- C. Protect products from weather and moisture by covering with heavy plastic or canvas and by maintaining heating within enclosure in accordance with manufacturer's instructions.

3.3 WARRANTY

- A. The manufacturer shall provide a limited five-year warranty against failure.

3.4 INSTALLATION

- A. Install surge suppressor equipment in accordance with manufacturer's recommendations.

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- 1 B. Install surge suppressor equipment plumb. Install recessed equipment flush with wall
2 finishes. Provide supports in accordance with Section 26 05 29.
- 3 C. The surge suppressors shall be connected in parallel to the power source, keeping
4 conductors as short and straight as practically possible. The conductors between the surge
5 suppressor and the power source shall be twisted together to reduce input conductor
6 impedance.
- 7 D. When the surge suppressor is connected to an electrical distribution panelboard the unit
8 shall be close nipped to the panel and be supplied by the circuit breaker indicated on the
9 drawings.
- 10 E. Provide engraved plastic nameplates under the provisions of Section 26 05 53.

11 END OF SECTION

SECTION 26 50 00

LUMINAIRES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior Luminaires and accessories.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts.
- E. Lamps.
- F. Luminaire accessories.
- G. Exterior Luminaires and accessories.

1.2 REFERENCES

- A. ANSI C78.379 - Electric Lamps - Incandescent and High-Intensity Discharge Reflector Lamps - Classification of Beam Patterns.
- B. ANSI C82.1 - Ballasts for Fluorescent Lamps - Specifications.
- C. ANSI C82.4 - Ballasts for High-Intensity Discharge and Low Pressure Sodium Lamps (Multiple Supply Type).
- D. ANSI/NFPA 70 - National Electrical Code.
- E. NEMA WD 6 - Wiring Devices-Dimensional Requirements.
- F. ACI - American Concrete Institute Specifications for Structural Concrete for Buildings.
- G. IESNA - Illuminating Engineering Society of North America.
- H. American Disabilities Act.

1.3 SUBMITTALS

- A. Within twenty-one (21) days of contract award, successful Contractor shall submit a complete list of lighting products he intends on furnishing with manufacturer and complete catalog designations, along with currently quoted lead times for delivery of same. Should the Contractor anticipate that the delivery schedule of any specified product may adversely impact the construction schedule, he shall bring it to the attention of the Owner at this time.
- B. Submit fixture shop drawings in booklet form with index and a separate sheet for each fixture, assembled in Luminaire "type" alphabetical order, with specified fixture and

accessories clearly indicated on each sheet. The manufacturer and catalog number of any associated ballast shall be indicated on fixture cut sheet. Each and every option and accessory which is scheduled for the fixture shall be clearly indicated on each sheet. Provide original cut sheet for each type of ballast utilized on the project. The sheets submitted shall be original cut sheets from the manufacturer's catalog, not photocopies. Indicate dimensions and description of each Luminaire construction.

C. For all luminaires with paint color or finish options, standard or custom, include a single color original of manufacturer's color or finish choices for architect's review

D. Shop drawings shall be submitted for review by the Engineer only after they have been reviewed and stamped by the Contractor.

E. Product Data - Fixtures: Provide dimensions, ratings, and performance data.

F. Product Data - Ballasts: Provide ratings and performance data for each type of ballast on project. If the lighting manufacturer cannot indicate the specific ballast being provided in the fixtures, it will be acceptable to provide the generic performance criteria of the ballast (ie GEB10) along with a list of possible ballast manufacturers that the fixture manufacturer may use to meet this criteria.

G. Product Data-Luminaire Ballast Disconnects: Provide data showing disconnect devices and location in/on fixture. Provide fixture wiring diagram showing actual location(s) of the luminaire ballast disconnects.

H. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Regulatory Requirements.

I. Manufacturer's Instructions: Include instructions for storage, handling, protection, examination, preparation, and installation of product.

J. Substitutions/Alternates: Should the Contractor wish to have considered products other than those specified they must submit complete information on the proposed items fourteen (14) days in advance of the bid. Failure to submit prior to the deadline constitutes a guarantee that the specified products will be supplied.

1.4 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include replacement parts list.

1.5 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Conform to requirements of NFPA 101.

C. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.6 EXTRA MATERIALS

- A. Provide five (5) replacement lamps for each lamp type installed.
- B. Provide two (2) of each ballast type.

PART 2 PRODUCTS

2.1 LUMINAIRES – GENERAL

- A. Provide lighting fixtures of the size, type and rating indicated in "Lighting Fixture Schedule," complete with, but not necessarily limited to, lamps, lampholders, reflectors, ballasts, starters, wiring, accessories and any other details required for a complete working installation.
- B. Fixture catalog numbers do not necessarily include all accessories and are intended to serve as a guide in defining types and manufacturers of unit only.
- C. Type of fixtures to be provided for each outlet is indicated by an alphanumeric designator on drawing.
- D. Gasketing material shall be vinyl, neoprene or other non-aging type material as approved by Engineer and is appropriate for the atmosphere in which the fixture is scheduled to be installed.
- E. EC shall field verify the ceiling type and coordinate with fixtures.
- F. Provide proper trim for each fixture as required for various types of ceilings being installed throughout project; plaster rings, fixture ends or caps, suspension units, mounting brackets, and/or other auxiliary parts necessary to make a complete fixture. It is the Contractor's responsibility to notify the Engineer in writing within 21 days after the bid date of any discrepancies between the electrical drawings, light fixture schedule, architectural plans, reflected ceiling plans and/or room finish schedules. Failure to notify the Engineer of discrepancies means that the Contractor is responsible for any costs associated with changing fixtures to match construction conditions.
- G. Housings:
 - 1. Shall be free from burrs, sharp corners and edges.
 - 2. Shall be steel, unless noted otherwise, formed and supported to prevent warping and sagging.
 - 3. Provide with spring loaded latches for all troffers.
 - 4. Housings shall be post-painted.
- H. Mounting Accessories:
 - 1. Recessed fixtures:
 - a. Provide trim type and accessories required for installation in ceiling types

- 1 specified and/or shown on the reflected ceiling plan and room finish
- 2 schedule.
- 3 b. Fixtures mounted in sloped ceilings shall be provided with sloped ceiling
- 4 adapters and appropriate trim rings and other accessories as required.
- 5 2. Surface mounted fixtures:
- 6 a. Provide ceiling spacers as required for fixtures not labeled as suitable for
- 7 direct mounting to a low-density ceiling.
- 8 3. Suspended fixtures:
- 9 a. Provide swivel canopy to accommodate any sloped ceilings as shown on
- 10 plans.
- 11 b. Provide pendant or cable length required to suspend luminaires at
- 12 indicated height.
- 13 c. Swivel hangers in mechanical equipment areas shall be shock-absorbing
- 14 types.
- 15 I. Finishes:
- 16 1. Painted finishes:
- 17 a. Shall be polyester powder painted enamel finish.
- 18 2. Polished, brushed, other metal finishes:
- 19 a. Shall be finished with clear coat to inhibit finish deterioration and
- 20 corrosion.
- 21 3. All finish types and colors shall be verified with the architect prior to ordering.
- 22 J. Louvers, Reflectors, Lenses:
- 23 1. All louvers and reflectors shall be semi-specular, low iridescent, clear alzak, unless
- 24 noted otherwise.
- 25 2. Parabolic louver depth shall have a minimum actual dimension of 3" unless
- 26 specified to be deeper. Two ballast covers shall be provided for all 3-lamp fixtures,
- 27 2x2 and 2x4.
- 28 3. All acrylic lenses shall be 100% virgin acrylic material with pattern 12 prismatic,
- 29 overall 0.125" minimum thickness.
- 30 K. Options and Accessories:
- 31 1. Refer to specific list on the Light Fixture Schedule. Coordinate all accessories such as air
- 32 supply, air return, air handling etc. with the other trades.
- 33 2.2 FLUORESCENT FIXTURES
- 34 A. Fabricate of sheet steel, die-formed to provide structural strength.

- B. Color finish of each lighting fixture is to be verified with the architect at the time of shop drawing review.
- C. Lens panels for surface box type fixtures and for recessed troffers shall be framed and be equipped with hinge and latch. Equip frames and louvers with retaining means to support frame during relamping.
- E. Design fixtures such that case temperature of ballast does not exceed 90° C.
- F. Provide internal ballast disconnecting means for each ballast. The disconnecting means shall be factory installed. Ideal Power Plug or equivalent.

2.3 HIGH INTENSITY DISCHARGE (HID) FIXTURES

- A. Include a prewired integral ballast and optical assembly.
- B. Suitable for continuous service at location shown in an ambient temperature at 40° C.
- C. Outdoor fixtures shall operate to -20° F.
- D. Ballast housing and structural parts including mounting devices shall be cast aluminum and include a provision for field mounting of safety chains.
- E. Optical assembly shall be hinged and latched for lamp access.
- F. Recessed H.I.D. fixtures shall be thermally protected in accordance with NEC Article 410.
- G. Lampholders shall be porcelain with a nickel-plated brass screw shell for medium and mogul base lamps.
- H. When quartz auxiliary lamp is indicated, provide quartz with time delay so quartz lamp stays lit until HID lamp returns to 50% of normal output. 24

2.4 EXIT SIGNS

- A. Shall have 6" high with 3/4" wide stroke lettering meeting all codes and standards.
- B. Provide directional arrows as indicated or required.
- C. Provide mounting accessories as required to back, end, pendant, top or flush mount per project requirements.
- D. Shall be of modular design, facilitating the replacement of individual parts.
- E. Shall be illuminated by LED's, unless noted otherwise.
- F. Shall have a die-cast aluminum housing unless noted otherwise.
- G. When indicated on the drawing, provide a pre-wired maintenance-free nicad battery backup with a 90-minute run time unless noted otherwise.
- H. Exit signs with internal battery backup shall have self-diagnostic system.

I. Exit signs in areas subject to physical abuse shall be provided with necessary physical protection.

J. Provide all edge-lit exit signs with opaque backing.

K. Exit light housings shall be designed, manufactured and rated for the atmosphere in which they are installed. Provide housings for damp, wet, corrosive or hazardous locations as required by the project.

2.5 BATTERY BACKED-UP EMERGENCY LIGHT UNITS

A. Shall have two lamp heads, minimum 7 watts per lamp.

B. Provide internal, pre-wired lead-acid battery, unless noted otherwise.

C. Provide with self-diagnostic system.

D. Emergency battery fixtures in areas subject to physical abuse shall be provided with necessary physical protection.

E. As noted on plans or schedules, each fixture shall be provided with a time delay circuit to keep emergency lighting on for a user-selected amount of time after normal power is restored.

2.6 OUTDOOR POLE MOUNTED FIXTURES

A. Ballast housing shall be easily accessible, dissipating heat from lamp and reflector.

B. Reflector shall be specular Alzak, designed to redirect reflected light in a uniform pattern.

C. Lens shall be heat and shock resistant tempered glass or one-piece molded acrylic of flat design mounted in a hinged door with gasketed seal and easy access latches.

D. Provide with in-line fuse accessible at hand hole. Each circuit shall be separately fused.

2.7 INCANDESCENT FIXTURES

A. Provide porcelain lamp holders in fixtures. Recessed incandescent fixtures shall be thermally protected in accordance with NEC Article 410.

2.8 BALLASTS GENERAL

A. All outdoor ballasts and ballasts in unheated areas shall operate to -20° F.

B. Ballasts shall comply with UL requirements with regards to thermal protection. Each ballast shall be equipped with thermal sensitive devices that will de-activate the ballast in the event higher than normal operating temperatures occur within the ballast. Internal protective devices shall be automatic resetting.

C. Use ballasts approved for low-density ceilings where fixtures are mounted against such ceilings.

- D. Remote mounted ballast shall be installed in individual ballast enclosures designed to adequately dissipate generated heat in an ambient temperatures of 100 deg. F. (measured outside of the enclosure).
- E. Ballast shall carry a minimum 3-year warranty fully covering replacement parts and labor for the life of the warranty.
- F. Ballast shall be marked with manufacturer's name, part number, supply voltage, power factor, ballast factor, open circuit voltage, current draw for each lamp type and UL Listing.
- G. The Electrical Contractor shall provide ballasts for fixtures in accordance with DILHR 63.53: The following luminaires located within the same room shall be tandem wired (master-slave) (Two lamp and four lamp ballasts may be used to achieve dual-level switching as shown on the drawings):
 - 1. One-lamp or three-lamp fluorescent luminaires recess mounted within 10 feet center-to-center of each other and;
 - 2. One-lamp or three-lamp fluorescent luminaires pendant or surface mounted within one foot edge-to-edge of each other.

2.9 FLUORESCENT BALLASTS

- 1. Ballast shall operate lamps at a frequency of 25 kHz or higher with less than 2% lamp flicker.
- 2. Ballast shall operate at an input voltage of 108 to 305 Vac (120/277V line) at an input frequency of 60 Hz. Light output shall remain constant for line voltage fluctuation of +/- 5%.
- 3. Ballast shall comply with EMI and RFI limits set by the FCC (CFR 47 part 18) for non-residential applications and not interfere with normal electrical equipment.
- 4. Ballast shall be Program Start and maintain full cathode heat during operation.
- 5. Ballast shall meet applicable ANSI standards.
- 6. Ballast shall have a minimum power factor of 0.99.
- 7. Ballast shall have a minimum ballast factor of 0.88 for T8s and 1.0 for T5H0 lamps.
- 8. Ballast shall not contain Poly-chlorinated Biphenyls (PCB's).
- 9. Ballast shall not be potted or weigh more than 1.3 pounds.
- 10. Ballast shall have 1.7 Lamp Current Crest Factor (LCCF) or less.
- 11. Ballast shall have less than 10% Total Harmonic Distortion.
- 12. Ballast shall have less than 6% Third Harmonic Distortion.
- 13. Ballast height shall be less than 1.5 inches.

14. Ballast shall have a poke-in, wiretrap connector.
15. Ballast shall meet sound rating "A".
16. Ballast must be Underwriters' Laboratories (UL) listed Class P, CSI certified.
17. Ballast shall provide normal rated lamp life as stated by lamp manufacturer.
18. Ballast shall withstand line transients as defined in IEEE 587, Category A.
19. Operating temperature shall not exceed 65 degrees C at any point on the case at a 40-degree C ambient.
20. Ballast must be suitable for use in circuits with occupancy sensor controls which cause frequent on-off switching. This type of operation shall not reduce lamp life.
21. Acceptable Manufacturers:
 - a. Universal.
 - b. Advance.
 - c. GE.
 - d. Osram/Sylvania/Motorola.

2.11 LAMPS

A. General:

1. Install specified lamps in each luminaire, emergency lighting unit and exit sign.
2. Any luminaire used for work light during construction, shall be relamped by the Contractor just prior to turnover of the area to owner, at no additional cost to the owner.
3. All lamps shall be delivered to the job in sealed cartons and protected from dirt and dust during storage on the project. Lamps shall be taken directly from the cartons and installed in the fixture with special care so that they do not become dusty and are not soiled in the operation.
4. Relamp luminaires which have failed at completion of work.
5. Lamps shall be furnished and installed by the contractor for all fixtures installed, moved, or otherwise reworked on this project, whether or not this contractor installs, moves, or otherwise reworks the fixture.

PART 3 EXECUTION

3.1 JOB CONDITIONS

- A. Contractor shall determine that ceiling suspension system is adequately supported to receive and support the lighting fixtures. Where deemed inadequate, do not install fixtures until additional support has been provided.

- 1 B. Verify local codes and ordinances that may pertain to installation and aiming of exterior
2 fixtures. Notify Engineer prior to Bid time if problems are encountered.

3 3.2 EXAMINATION

- 4 A. Examine substrate and supporting grids for Luminaires and notify Engineer in writing of
5 conditions detrimental to proper and timely completion of work.
- 6 B. Do not proceed with work until unsatisfactory conditions have been corrected.
- 7 C. Verify ceiling system compatibility with recessed fixture mounting before releasing the
8 order for manufacture.
- 9 D. Examine each Luminaire to determine suitability for lamps specified.

10 3.3 INSTALLATION – GENERAL

- 11 A. Install in accordance with manufacturer's instructions.
- 12 B. Make fixture holes for wire entrance with knock-out punches or hole saw, remove burrs.
13 Do not cut holes with tin snips.
- 14 C. Special care shall be taken to assure light-tight joints between recessed fixtures and ceiling.
- 15 D. Recessed lighting fixtures which are installed in a rough textured ceiling surface where
16 light may be emitted between fixture frame and ceiling surface shall have black self-
17 adhesive polyfoam gasketing installed around inside edges of frame to prevent light leaks.
- 18 E. Care shall be taken in placement of outlets and surface-mounted fixtures to maintain
19 alignment, spacings, layout, and general arrangement shown on drawings. Contractor may
20 vary these dimensions slightly in order to clear obstructions. Any major changes in the
21 arrangement must be approved by Engineer.
- 22 F. Mount wall and ceiling fixtures independent and secure so that they are not dependent on
23 finish for support and cannot be rotated or displaced.
- 24 G. Maintain clearances as required in Article 410 of the NEC. Notify Engineer of any conflict,
25 prior to rough-in.
- 26 H. Install suspended Luminaires using pendants supported from swivel hangers. Provide
27 pendant length required to suspend Luminaire at indicated height. Verify heights in the
28 field.
- 29 I. Install surface mounted Luminaires plumb and adjust to align with building lines and with
30 each other. Secure to prohibit movement.
- 31 J. Install wall mounted Luminaires at height as indicated on Drawings.
- 32 K. Install accessories furnished with each Luminaire.
- 33 L. Make wiring connections to branch circuit using building wire with insulation suitable for
34 temperature conditions within Luminaire.

- M. Bond products and metal accessories to branch circuit equipment grounding conductor.
- N. The aiming and adjustment of luminaires must take place after the Project's amenities have been completely installed. These amenities shall include, but not necessarily limited to plantings, furniture, artwork, graphics and signage. Contractor shall include in his base bid, provisions for lifts, scaffolding, extension ladders, and all other materials required to complete adjustments to the satisfaction of the Architect, Engineer and Owner.
- O. Install specified lamps in each Luminaire.
- P. When Metal Halide lamps are operated on a continuous basis (24 hours/day – 7days/week) the contractor shall inform the owner to turn off the lamps at least once a week for at least 15 minutes.

3.4 INSTALLATION – INDOOR

- A. Coordinate with trades so lighting fixtures are properly aligned with items such as diffusers, grilles, speakers, sprinkler heads and structure. Coordinate any conflicts with architect and, if necessary, relocate fixtures as directed so there will be no conflict with other equipment or structure.
- B. Install tandem fixtures in continuous rows so that finished appearance conforms to appearance of individual units.
- C. Align and plumb rows of light fixtures and individual fixtures. Adjust to the satisfaction of the Engineer.
- D. Provide additional trim as required for closing openings around recessed fluorescent lights which are mounted in patterns.
- E. Support Luminaires larger than 2' x 4' size independent of ceiling framing.
- F. Locate recessed ceiling Luminaires as indicated on lighting plan. Coordinate all discrepancies between the lighting plan and the reflected ceiling plan and room finish schedule with the architect prior to installation.
- G. Exposed Grid Ceilings: Provide auxiliary members spanning ceiling Ts to support surface mounted Luminaires.
- H. Install recessed Luminaires to permit removal of all components that may require maintenance from below.
- I. Install recessed Luminaires using accessories and fire stopping materials to meet regulatory requirements for fire rating or spacing required from insulation in ceiling space.
- J. Install clips to secure recessed grid-supported Luminaires in place.
- K. Connect recessed Luminaires to branch circuit outlets provided under Section 26 05 34 using flexible conduit only. Allow for positioning of Luminaires in ceiling tile increments.

3.4 INSTALLATION – OUTDOOR

- A. Provide a smooth rubbed finish on exposed concrete associated with concrete bases. Finish shall be per ACI 301-89, paragraph 10.31.
- B. Lighting fixtures shall be aimed as directed by the Architect/Engineer.
- C. Aiming shall be done at night so the performance can be demonstrated. Provide vehicle with bucket lift for examination and aiming of pole mounted lights.
- D. Install poles plumb and level.
- E. Provide accessories as indicated on drawings and fixture schedule.

3.6 FIELD QUALITY CONTROL

- A. Operate each Luminaire after installation and connection. Inspect for proper connection and operation.

3.7 ADJUSTING

- A. Aim and adjust Luminaires [as indicated on Drawings] [as directed].
- B. Adjust exit sign directional arrows as indicated.
- C. Relamp Luminaires [that have failed lamps] at Substantial Completion.

3.8 CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from enclosure.
- C. Clean photometric control surfaces as recommended by manufacturer.
- D. Clean finishes and touch up damage.

END OF SECTION

SECTION 31 10 00

SITE CLEARING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Removing surface debris.
2. Removing designated paving, curbs, and conc.
3. Removing designated vegetated areas.
4. Removing abandoned utilities.
5. Excavating topsoil.

B. Related Sections:

1. Section 02 41 16 - Structure Demolition: Removing underground storage tanks and designated utilities.
2. Section 31 22 13 - Rough Grading.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data for herbicide. Indicate compliance with applicable codes for environmental protection.

1.3 SUSTAINABLE DESIGN SUBMITTALS

A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:

- a. Certify source for local and regional materials and distance from Project site.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:

a. Local and regional products.

b. Recycled products.

1.4 QUALITY ASSURANCE

A. Conform to applicable code for environmental requirements, disposal of debris and use of herbicides. Burning debris on-site is not permitted.

B. Sustainable Design Requirements:

1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

C. Perform Work in accordance with City of Columbus Construction and Materials Specifications and the State of Ohio Standards.

PART 2 PRODUCTS

2.1 MATERIALS

A. Herbicide: Industry standard chemicals, approved by authority having jurisdiction.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify existing plant life designated to remain is tagged or identified.

3.2 PREPARATION

A. Call Local Utility Line Information service at 800-362-2764 not less than ten working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Have utilities, within any construction are not cleared by Utilities Protection Service, located and marked by a private utility locating firm.

3.3 PROTECTION

A. Protect trees, plant growth, and features designated to remain.

B. Protect benchmarks from damage or displacement. Take all measures necessary to safeguard all existing work and facilities.

C. Furnish and install fencing or other barriers as shown on the plans or as otherwise necessary to protect existing features.

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- D. Verify the locations of, and protect, any buildings, structures, utilities, paved surfaces, signs, streetlights, utilities, landscaping and all other such facilities that are intended to remain or be salvaged.
- E. Make such explorations and probes as necessary to ascertain any required protection measures that shall be used before proceeding with demolition.
- F. Provide and maintain adequate catch platforms, warning lights, barricades, guards, weather protection, dust protection, fences, planking, bracing, shoring, piling, signs, and other items required for proper protection.
- G. Provide protection for workmen, public, adjacent construction and occupants of existing building(s).
- H. Repair or replace any damaged facilities that are not scheduled for demolition.
- I. Keep streets, walks and all other adjacent paved areas clean and swept clear of dirt, mud and debris deposited as a result of this operation.
- J. Protect surrounding area from dust. Control rodents, and other vermin associated with demolition operations.
- K. Locate and protect utilities indicated to remain, from damage.

3.4 CLEARING

- A. Clear and grub stumps, logs, roots, other organic matter areas required for execution of Work to the following minimum depths:
 - 1. New roads and drives and parking areas: 36 inches below subgrade
 - 2. New concrete slabs: 24 inches below subgrade
 - 3. New lawn areas: 18 inches
 - 4. New footings and foundations for signs, lights, etc.: 24 inches below footing base.
- C. Clear undergrowth and deadwood, without disturbing subsoil.
- D. Apply herbicide to remaining stumps to inhibit growth.

3.5 REMOVAL

- A. Remove debris, rock, and extracted plant life from site. Remove all equipment, fixtures and other materials scheduled for salvage prior to beginning demolition operations.
- B. Demolish and remove all pavements and structures scheduled for demolition as shown on the plans.
- C. Abandon utilities in accordance with local utility company requirements, or applicable substantive requirements if considered private.

- D. Carry out vehicle loading as necessary within the project boundaries or as defined or indicated on the drawings, but not in locations that block vehicular traffic on the streets or pedestrian traffic on adjacent public walks.
- E. Conduct demolition operations and the removal of rubbish and debris in such a way that a minimum of nuisance dust is caused. Constantly sprinkle rubbish and debris with water if necessary to keep nuisance dust to a minimum.
- F. Where necessary to prevent collapse of any construction, install temporary shores, underpinning, struts or bracing. Do not commence demolition work until all temporary construction is complete.
- G. During the execution of the work, provide, operate, and maintain all pumping equipment, suction and discharge lines in a number of capacity as required to keep all cellars and pits free of water from any source whatsoever at all times.
- H. Where limits of demolition are exposed in the finished work, cutting shall be made with saws, providing an absolutely straight line, plumb, true and square.
- I. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- J. Do not burn or bury materials on site. Leave site in clean condition.

3.6 PAVEMENT AND BASE REMOVAL

- A. The pavement shall be broken up and removed for its entire depth. Where concrete pavement is to be removed, the Contractor shall provide a neat edge along the pavement being retained by sawing the pavement no less than 6 inches before breaking the adjacent pavement away. The disposal of all materials resulting from the pavement removal shall be done as stated in Section 01 74 19.
- B. All materials which cannot be used in the work shall be disposed of by the Contractor in accordance with Section 01 74 19.

3.7 TOPSOIL STRIPPING

- A. Strip topsoil from the area indicated on the drawings without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Any excess topsoil that is not intended for reuse on site shall be removed from the site.

END OF SECTION

SECTION 31 22 13

ROUGH GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating subsoil.
2. Cutting, grading, filling, rough contouring, and compacting the site for the work.

B. Related Sections:

1. Section 02 41 16 - Structure Demolition.
 2. Section 31 10 00 - Site Clearing: Excavating topsoil.
 3. Section 31 23 16 - Excavation: Building excavation.
 4. Section 31 23 17 - Trenching: Trenching and backfilling for utilities.
 5. Section 31 23 23 - Fill: General building area backfilling.
 6. Section 32 91 19 - Landscape Grading: Finish grading with topsoil to contours.
- C. The Contractor shall assume sole responsibility for the computations of all grading and for the actual land balance, including utility trench spoil. The Contractor shall import or export all material as necessary to complete the project.

1.2 PERMITS & NOTIFICATIONS

- A. Obtain all local, state, and federal permits and pay all fees required for the Work specified herein.
- B. Perform all Work in accordance with the aforementioned permits.

1.3 REFERENCES

A. ASTM International:

1. ASTM D422 - Standard Test Method for Particle Size Analysis of Soils
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³).
3. ASTM D6938 - Standard Test Method for Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.
b. Certify source for local and regional materials and distance from Project site.

- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:

- a. Products with recycled material content.
b. Local and regional products.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

- B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C136, ASTM D2419, and ASTM D2434.

- B. Sustainable Design Requirements:

1. Recycled Content Materials: Furnish materials with recycled content.
2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

- C. Perform Work in accordance with City of Columbus Construction and Materials Specifications and the State of Ohio Standards.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Earth Fill:

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1. Clean material consisting of inorganic soil or a mixture of inorganic soil and rock, stone or gravel. The material shall be free of topsoil, sod, stumps, wood, asphalt, concrete, debris, and other deleterious material. The maximum dimension of any material shall not exceed 2-inch in any direction. Material shall have a maximum Plasticity Index of 15 and a maximum Liquid Limit of 40.

B. Granular Fill:

1. Clean material meeting the requirements of "AASHTO M43 # 10" as defined in the City of Columbus Construction and Materials Specifications.

C. Structural Fill:

1. Clean material meeting the requirements of "Modified Backfill" as defined in the City of Columbus Construction and Materials Specifications, except that no more than 8% shall pass the No. 200 sieve.
2. 4" Trimmable, Compactible Granular Fill (Not Sand): Clean material conforming to ASTM D448 No. 10 with plenty of rock fines to be used as blotter course above the vapor retarder below interior slabs on grade.

D. Breaker Run Aggregate:

1. Crushed Stone, rock or gravel meeting the requirements of "Embankment Materials" as defined in the City of Columbus Construction and Materials Specifications Section 703.11.

E. Topsoil: Type as specified in Section 32 91 13.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions.
- B. Verify survey benchmark and intended elevations for the Work are as indicated on Drawings.

3.2 PREPARATION

- A. Call Local Utility Line Information service at 1-800-362-2764 not less than three working days before performing Work.
 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Have utilities, within any construction area not cleared by Utilities Protection Service, located and marked by a private utility locating firm.
- C. Identify required lines, levels, contours, and datum.
- D. Notify utility company to remove existing utilities.

- E. Protect utilities indicated to remain from damage.
- F. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

3.3 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.
- B. Do not excavate wet subsoil or excavate and process wet material to obtain optimum moisture content.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Remove excess subsoil not intended for reuse, from site.
- E. Benching Slopes: Horizontally bench existing slopes greater than 1V: 3H (unless otherwise noted on the Drawings) to key placed fill material to slope to provide firm bearing.
- F. Stability: Replace damaged or displaced subsoil as specified for fill.

3.4 FILLING

- A. Earth Fill is acceptable fill material during rough grading.
- B. Fill areas to contours and elevations with unfrozen materials.
- C. Place fill material in continuous layers and compact in accordance with schedule at end of this section.
- D. Maintain optimum moisture content of fill materials to attain required compaction density.
- E. Make grade changes gradual. Blend slope into level areas.
- F. Repair or replace items indicated to remain damaged by excavation or filling.

3.5 TOLERANCES

- A. Top Surface of Subgrade: Plus or minus 0.1 foot from required elevation.

3.6 FIELD QUALITY CONTROL

- A. Perform laboratory material tests in accordance with ASTM 422 and ASTM D1557.
- B. Perform in place compaction tests in accordance with ASTM D6938.
- C. When tests indicate Work does not meet specifications for composition or compaction, remove Work, replace and retest (See Section 31 23 23 for composition requirements. Compaction requirements follow).
- D. Frequency of Tests:

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Material	Test Required	Test/Sample Frequency
Granular Fill, Structural Fill, Earth Fill	D422 Standard Test Method for Particle Size Analysis of Soils	1 test/500 cy placed
Granular Fill, Structural Fill, Earth Fill	D1557 Test Method for Laboratory Compaction Characteristics or Soil Using Modified Effort	1 test/500 cy placed
Granular Fill, Earth Fill	D6938 Standard Test Method for Density and Water Content of Soil and Soil Aggregate by Nuclear Methods	1 test/1000 sf placed/lift
Structural Fill	D6938 Standard Test Method for Density and Water Content of Soil and Soil Aggregate by Nuclear Methods	1 test/500 sf placed/lift

1 3.7 SCHEDULES

Location	Required Material	Maximum Compacted Lift Thickness	Minimum Proctor Compaction	Minimum Relative Density (a)
Areas Beneath Footings, Floor Slabs, or Structures	Structural Fill	8"	95% Modified	70%
Footing, Foundation and Structure Backfill	Structural Fill	8"	95% Modified	70%
Areas within 10' of Existing or Proposed Building or Structure Footing or Slab	Granular Fill	10"	90% Modified	60%
Areas Beneath Existing or Proposed Pavement (Roads, Drives, Walks)	Granular Fill	10"	90% Modified	60%
Turf Areas Turf and Other Planted Areas	Earth Fill	10"	90% Modified	60%

(a) Minimum relative density as determined by ASTM D-4253 for coarse-grained soils with less than 15% by mass passing the No. 200 sieve. Applicable only when minimum proctor compaction cannot be achieved.

END OF SECTION

SECTION 31 23 16

EXCAVATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating for building foundations.
2. Excavating for paving, roads, and parking areas.
3. Excavating for slabs-on-grade.
4. Excavating for site structures.
5. Excavating for landscaping.

B. Related Sections:

1. Section 31 23 17 - Trenching: Excavating for utility trenches.
2. Section 31 23 23 - Fill.

1.2 REFERENCES

- A. Local utility standards when working within 24 inches of utility lines.

1.3 QUALITY ASSURANCE

- A. Perform Work in accordance with City of Columbus Construction and Materials Specifications and the State of Ohio Standards.

1.4 QUALIFICATIONS

- A. Prepare excavation protection plan under direct supervision of Professional Engineer experienced in design of this Work and licensed in State of Ohio.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

3.1 PREPARATION

- A. Call Local Utility Line Information service at 800-362-2764 not less than ten working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding

1 construction areas.

2 B. Have utilities, within any construction area not cleared by Utilities Protection Service,
3 located and marked by a private utility locating firm.

4 C. Identify required lines, levels, contours, and datum.

5 D. Protect utilities indicated to remain from damage.

6 E. Protect plant life, lawns, and other features remaining as portion of final landscaping.

7 F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving,
8 and curbs from excavating equipment and vehicular traffic.

9 3.2 EXCAVATION

10 A. Underpin adjacent structures and existing and proposed utilities which may be damaged by
11 excavation work.

12 B. Excavate subsoil to accommodate paving, site features and structures, and construction
13 operations.

14 C. Compact disturbed load bearing soil in direct contact with foundations to original bearing
15 capacity; perform compaction in accordance with Section 31 23 17 and Section 31 23 23.

16 D. Slope banks with machine to angle of repose or less until shored.

17 E. Do not interfere with 45 degree bearing splay of foundations.

18 F. Grade top perimeter of excavation to prevent surface water from draining into excavation.

19 G. Trim excavation. Remove loose matter.

20 H. Remove lumped subsoil, boulders, and rock up to 1/3 cubic yard measured by volume.
21 Remove larger material as specified in Section 31 23 23.

22 I. Notify the CMT of unexpected subsurface conditions.

23 J. Correct areas over excavated with Breaker Run Aggregate as specified in Section 31 23
24 23. Undercutting and related excavation shall be completed only when directed by the
25 Engineer. The Contractor shall not be compensated for any unauthorized undercutting or
26 excavation. Measure and document undercut areas and depths in consultation with the
27 Engineer.

28 K. Remove excess and unsuitable material from site.

29 L. Repair or replace items damaged by excavation.

30 3.3 FIELD QUALITY CONTROL

31 A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and
32 balancing.

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1 B. Perform inspection of excavation and controlled fill operations in accordance with
2 applicable code.

3 C. Request visual inspection of bearing surfaces by Owner before installing subsequent work.

4 3.4 PROTECTION

5 A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.

6 B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

7 C. Protect structures, utilities and other facilities from damage caused by settlement, lateral
8 movement, undermining, washout, and other hazards created by earth operations.

9 END OF SECTION

SECTION 31 23 17

TRENCHING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavating trenches for utilities from 5 feet outside building to utility service connection points.
2. Compacted fill from top of utility bedding to subgrade elevations.
3. Backfilling and compaction.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Concrete materials.
3. Section 31 23 16 - Excavation: General building excavation.
4. Section 31 23 23 - Fill: General backfilling.

1.2 PERMITS & NOTIFICATIONS

A. Obtain all local, state, and federal permits and pay all plan review and permit fees and deposits required for the Work specified herein.

B. Perform all Work in accordance with the aforementioned permits.

1.3 REFERENCES

A. ASTM International:

1. ASTM D422 - Standard Test Method for Particle Size Analysis of Soils
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³).
3. ASTM D6938 - Standard Test Method for Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.4 DEFINITIONS

A. Utility: Any buried pipe, duct, conduit, or cable.

1.5 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

1 B. Materials Source: Submit name of imported fill materials suppliers.

2 C. Materials testing reports.

3 1.6 SUSTAINABLE DESIGN SUBMITTALS

4 A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design
5 submittals.

6 B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design
7 requirements.

8 1. Materials Resources Certificates:

9 a. Certify recycled material content for recycled content products.

10 b. Certify source for local and regional materials and distance from Project
11 site.

12 C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable
13 design requirements. Exclude cost of labor and equipment to install products.

14 1. Provide cost data for the following products:

15 a. Products with recycled material content.

16 b. Local and regional products.

17 1.7 QUALITY ASSURANCE

18 A. Sustainable Design Requirements:

19 1. Regional Materials: Furnish materials extracted, processed, and manufactured
20 within 500 miles of Project site.

21 B. Perform Work in accordance with City of Columbus Construction and Materials
22 Specifications and the State of Ohio Standards.

23 1.8 QUALIFICATIONS

24 A. Prepare excavation protection plan under direct supervision of Professional Engineer
25 experienced in design of this Work and licensed in State of Ohio.

26 1.9 FIELD MEASUREMENTS

27 A. Verify field measurements prior to fabrication.

28 1.10 COORDINATION

29 A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

30 B. Verify Work associated with lower elevation utilities is complete before placing higher
31 elevation utilities.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Earth Fill:

1. Clean material consisting of inorganic soil or a mixture of inorganic soil and rock, stone or gravel. The material shall be free of topsoil, sod, stumps, wood, asphalt, concrete, debris, and other deleterious material. The maximum dimension of any material shall not exceed 2-inch in any direction. Material shall have a maximum Plasticity Index of 15 and a maximum Liquid Limit of 40.

B. Granular Fill:

1. Clean material meeting the requirements of "AASHTO M43 # 10" as defined in the City of Columbus Construction and Materials Specifications.

C. Structural Fill:

1. Clean material meeting the requirements of "Modified Backfill" as defined in the City of Columbus Construction and Materials Specifications, except that no more than 8% shall pass the No. 200 sieve.
2. 4" Trimmable, Compactible Granular Fill (Not Sand): Clean material conforming to ASTM D448 No. 10 with plenty of rock fines to be used as blotter course above the vapor retarder below interior slabs on grade.

D. Breaker Run Aggregate:

1. Crushed Stone, rock or gravel meeting the requirements of "Embankment Materials" as defined in the City of Columbus Construction and Materials Specifications Section 703.11. Utility Bedding and Cover:
2. Utility bedding and cover shall be clean material meeting the requirements of "Compacted Backfill" as defined in the City of Columbus Construction and Materials Specifications Section 912.02

PART 3 EXECUTION

3.1 LINES AND GRADES

A. Lay pipes to lines and grades indicated on Drawings.

1. Owner reserves right to make changes in lines, grades, and depths of utilities when changes are required for Project conditions.

B. Use laser-beam instrument with qualified operator to establish lines and grades.

3.2 PREPARATION

A. Call Local Utility Line Information service at 800-362-2764 not less than ten working days before performing Work.

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1. Request underground utilities to be located and marked within and surrounding construction areas.

B. Have utilities, within any construction area not cleared by Utilities Protection Service, located and marked by a private utility locating firm.

C. Identify required lines, levels, contours, and datum locations

D. Protect plant life, lawns, and other features remaining as portion of final landscaping.

E. Protect bench marks, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

F. Maintain and protect above and below grade utilities indicated to remain.

G. Establish temporary traffic control when trenching is performed in public right-of-way. Relocate controls and reroute traffic as required during progress of Work.

3.3 UNDERGROUND UTILITY LOCATES

A. Contractor shall include ten (10) underground utility locates at locations designated on the plans or where directed by the CMT. Locates shall include excavation, backfill, survey, and pictures of existing utilities with the construction limits. Survey information shall include size, elevation, GPS location within +/-1-inch, materials and height and width of utility. Locates shall be authorized by the CMT.

3.4 TRENCHING

A. Excavate subsoil required for utilities.

B. Remove lumped subsoil, boulders, and rock.

C. Perform excavation near existing utility service in accordance with utility's requirements.

D. Trench from utility downstream to upstream.

E. Cut trenches sufficiently wide to enable installation and allow inspection. Remove water or materials that interfere with Work.

F. Excavate bottom of trenches maximum 1 foot wider than outside diameter of pipe.

G. Excavate trenches to depth indicated on Drawings. Provide uniform and continuous bearing and support for bedding material and pipe.

H. Do not interfere with 45 degree bearing splay of foundations.

I. Provide sheeting and shoring to protect excavation as specified in this section.

J. When subsurface materials at bottom of trench are loose or soft, excavate to greater depth until suitable material is encountered. Backfill undercut areas with granular backfill and compact to density equal to or greater than requirements for subsequent backfill material.

1 K. Trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

2 L. Correct areas over excavated areas with compacted granular backfill.

3 M. Remove excess soil and subsoil not intended for reuse, from site.

4 3.5 SHEETING AND SHORING

5 A. Sheet, shore, and brace excavations to prevent danger to persons, existing and proposed
6 utilities, structures and adjacent properties and to prevent caving, erosion, and loss of
7 surrounding subsoil.

8 B. Work shall comply with federal, state, and local trenching and shoring requirements,
9 including 29 CFR Part 1926.

10 C. Remove sheeting and shoring at completion of excavation work.

11 D. Repair damage caused by failure of the sheeting, shoring, or bracing and for settlement of
12 filled excavations or adjacent soil.

13 E. Repair damage to new Work and existing facilities from settlement, water or earth pressure
14 or other causes resulting from inadequate sheeting, shoring, or bracing.

15 3.6 BACKFILLING

16 A. Backfill trenches to contours and elevations with unfrozen backfill materials.

17 B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over
18 porous, wet, frozen, or spongy subgrade surfaces.

19 C. Place backfill material in continuous layers and compact in accordance with schedule at
20 end of this section.

21 D. Employ placement method that does not disturb or damage utilities in trench and adjacent
22 site features.

23 E. Maintain optimum moisture content of backfill materials to attain required compaction
24 density.

25 F. Do not leave trenches open at end of working day.

26 G. Protect open trench to prevent danger to the public and construction workers.

27 H. Place and compact backfill in 4" to 6" lifts.

28 3.7 TOLERANCES

29 A. Section 01 40 00 - Quality Requirements: Tolerances.

30 B. Top Surface of Backfilling Under Paved Areas: Plus or minus 1/2 – inch from required
31 elevations.

C. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.8 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Perform laboratory material tests in accordance with ASTM D422 and D1557.

C. Perform in place compaction tests in accordance with ASTM D6938.

D. When tests indicate Work does not meet specified requirements, remove Work, replace, compact, and retest.

E. Frequency of Tests: 1 test per lift per 200 liner feet of trench..

3.9 PROTECTION OF FINISHED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.

B. Reshape and re-compact fills subjected to vehicular traffic during construction.

3.10 SCHEDULE

A. Storm, sanitary, and water service Piping:

1. Cover pipe and bedding with utility bedding and cover: To 1 foot above top of the pipe elevation. Mechanically or hand tamp uniformly to minimum 95% Standard Proctor.

2. Below site roads and parking lots: Backfill to bottom of pavement subgrade with Granular Backfill. Compact to 90% Modified Proctor with 60% Minimum Relative Density.

3. Below turf areas: Backfill to bottom of topsoil layer with Earth Backfill. Compact to 90% Modified Proctor with 60% Minimum Relative Density.

4. Below public right-of-way: Backfill to bottom of pavement subgrade in compliance with City of Columbus permit requirements.

END OF SECTION

SECTION 31 23 19

DEWATERING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dewatering system.
2. Surface water control system.
3. Monitoring wells.
4. System operation and maintenance.
5. Water disposal.

B. Related Sections:

1. Section 00 31 00 - Available Project Information: Subsurface investigation report including boring logs, soil profiles, and groundwater levels with seasonal river stage variations.
2. Section 31 23 16 - Excavation: Excavation for structures below ground water table.
3. Section 31 23 17 - Trenching: Trenching for utilities below ground water table.
4. Section 31 25 13 - Erosion Controls: Surface water runoff control.

1.2 REFERENCES

A. ASTM International:

1. ASTM C33 - Standard Specification for Concrete Aggregates.

1.3 DEFINITIONS

A. Dewatering includes the following:

1. Lowering of ground water table and intercepting horizontal water seepage to prevent ground water from entering excavations and trenches.
2. Reducing piezometric pressure within strata to prevent failure or heaving of excavations and trenches.
3. Disposing of removed water.

B. Surface Water Control: Removal of surface water within open excavations.

1.4 SYSTEM DESCRIPTION

- A. Provide dewatering and surface water control systems to permit Work to be completed on dry and stable subgrade.
 - 1. Install well points and/or wells to dewater and relieve hydrostatic pressure within strata identified as water bearing in subsurface investigation.
- B. Provide monitoring wells and monitoring equipment to obtain meaningful observations of conditions affecting excavation and adjacent structures.
- C. Furnish standby equipment stored at Project site and ready for immediate use upon failure of dewatering equipment. Provide the following standby equipment, but not less than one of each type:
 - 1. Dewatering Pumps: 50 percent.
 - 2. Portable Electric Generators or other secondary power source: 100 percent.

1.5 PERFORMANCE REQUIREMENTS

- A. Design dewatering systems to:
 - 1. Lower water table within areas of excavation to minimum 2 feet below bottom of excavation to permit Work to be completed on dry and stable subgrade.
 - 2. Relieve hydrostatic pressures in confined water bearing strata below excavation to eliminate risk of uplift or other instability of excavation.
 - 3. Prevent damage to adjacent properties, buildings, structures, utilities, and facilities from construction operations.
 - 4. Prevent loss of fines, quick condition, or softening of foundation subgrade.
 - 5. Maintain stability of sides and bottoms of excavations and trenches.
- B. Design surface water control systems to:
 - 1. Collect and remove surface water and seepage entering excavation.

1.6 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
 - 1. Indicate dewatering system layout, well depths, well screen lengths, dewatering pump locations, pipe sizes and capacities, grades, filter sand gradations, surface water control devices, valves, and water disposal method and location.
 - 2. Indicate primary and standby power system location and capacity.

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3. Indicate layout and depth of monitoring wells, piezometers and flow measuring devices for system performance measurement.

4. Include detailed description of dewatering and monitoring system installation procedures and maintenance of equipment.

5. Include description of emergency procedures to follow when problems arise.

C. Product Data: Submit data for each of the following:

1. Dewatering Pumps: Indicate sizes, capacities, priming method, engine/ motor characteristics.

2. Pumping equipment for control of surface water within excavation.

D. Field Reports: Test and monitoring reports as specified in Field Quality Control article.

1.7 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

B. Project Record Documents: Record actual locations and depths of capped wells and piping abandoned in place.

1.8 QUALITY ASSURANCE

A. Comply with authorities having jurisdiction for the following:

1. Drilling and abandoning of wells used for dewatering systems.

2. Water discharge and disposal from pumping operations.

B. Obtain permit from EPA under National Pollutant Discharge Elimination System (NPDES), for storm water discharge from construction sites.

C. Perform Work in accordance with City of Columbus Construction and Materials Specifications and the State of Ohio Standards.

1.9 QUALIFICATIONS

A. Installer: Company specializing in performing work of this section with minimum 5 years experience and responsible for design, operation, and maintenance of dewatering systems.

1. Assume sole responsibility for dewatering and surface water control systems and for loss or damage resulting from partial or complete failure of protective measures and settlement or resultant damage caused by ground water control operations.

1.10 SEQUENCING

A. Section 01 10 00 - Summary: Requirements for sequencing.

B. Sequence work to obtain required permits before start of dewatering operations.

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C. Sequence work to install and test monitoring systems minimum 3 days before testing and operating dewatering systems.

D. Sequence work to install and test dewatering and surface water control systems minimum 3 days before starting excavation and trenching.

1.11 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

B. Coordinate work to permit the following construction operations to be completed on dry stable substrate.

1. Excavation for structures specified in Section 31 23 16.

2. Trenching for utilities specified in Section 31 23 17.

PART 2 PRODUCTS

2.1 DEWATERING EQUIPMENT

A. Select dewatering equipment to meet specified performance requirements.

2.2 MONITORING EQUIPMENT

A. Piezometers: Standpipe type for push in installation to monitor water elevation.

B. Flow Measurement: Furnish devices as follows:

1. Pitometer installed on discharge of pipe of from each well.

2. Pitometer installed to measure flow from entire dewatering system.

2.3 ACCESSORIES

A. Valves and Fittings: Furnish valves and fittings to isolate each well from header pipe and to prevent loss of pump prime.

B. Filter Sand: ASTM C33; natural river or bank sand; washed; free of silt, clay, loam, friable or soluble materials, and organic matter; graded to suit well screen.

C. Grout: Mixture of Portland cement and bentonite clay or sand suitable for sealing abandoned wells and piping.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Conduct additional borings and investigations to supplement subsurface investigations

identified in Section 00 31 00 as required to complete dewatering system design.

C. Call Local Utility Line Information service at 1-800-362-2764 not less than three working days before performing Work.

1. Request underground utilities to be located and marked within and surrounding construction areas.

D. Have utilities, within any construction area not cleared by Utilities Protection Service, located and marked by a private utility locating firm.

3.2 PREPARATION

A. Protect existing adjacent buildings, structures, and improvements from damage caused by dewatering operations.

3.3 MONITORING WELLS

A. Install monitoring wells at locations indicated on shop drawings as specified for dewatering wells.

B. Test each monitoring well point to verify installation is performing properly.

C. Install piezometers, calibrate, and test for proper operation.

D. Protect monitoring well standpipes from damage by construction operations.

E. Maintain accessibility to monitoring wells continuously during construction operations.

F. Maintain monitoring wells until groundwater is allowed to return to normal level.

3.4 DEWATERING SYSTEM

A. Install dewatering system in accordance with shop drawings.

B. Locate system components to allow continuous dewatering operations without interfering with installation of permanent Work and existing public rights-of-way, sidewalks, and adjacent buildings, structures, and improvements.

C. Drill wells in sizes and to depth indicated. Provide temporary surface casing when required to stabilize soil while advancing well.

D. Install self jetting well points in sizes indicated by driving and jetting to depth indicated.

E. While drilling and installing well keep bore hole filled with natural or organic drilling fluid. Bentonite clay drilling fluid is not permitted.

F. Attach well screen to riser pipe. Attach centralizers to riser pipe at maximum 20 feet spacing to keep screen and riser centered in bore hole. Insert well screen and riser pipe into well to elevation indicated.

G. Install sand filter surrounding well screen.

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H. Develop wells to remove clay, silt, and sand from well screen and immediate vicinity of bore hole.

I. Test well for proper water flow through well screen and pumping rate for dewatering system operation. Repeat development until well meets performance requirements.

J. Cover and seal top of well until pump is installed.

K. Install pumps in accordance with manufacturer's instructions.

L. Connect pumps to discharge header. Install valves to permit pump isolation.

3.5 SURFACE WATER CONTROL SYSTEM

A. Provide ditches, berms, and other devices to divert and drain surface water from excavation area.

B. Divert surface water and seepage water within excavation areas into sumps and pump water into drainage channels, storm drains, and settling basins in accordance with requirements of agencies having jurisdiction.

C. Control and remove unanticipated water seepage into excavation.

3.6 SYSTEM OPERATION AND MAINTENANCE

A. Operate dewatering system continuously until backfilling is complete.

B. Provide 24-hour supervision of dewatering system by personnel skilled in operation, maintenance, and replacement of system components.

C. Conduct daily observation of dewatering system and monitoring system. Make required repairs and perform scheduled maintenance.

D. Fill fuel tanks before tanks reach 25 percent capacity.

E. Start emergency generators at least twice each week to check operating condition.

F. When dewatering system cannot control water within excavation, notify the Owner and stop excavation work.

1. Supplement or modify dewatering system and provide other remedial measures to control water within excavation.

2. Demonstrate dewatering system operation complies with performance requirements before resuming excavation operations.

G. Modify dewatering and surface water control systems when operation causes or threatens to cause damage to new construction, existing site improvements, adjacent property, or adjacent water wells.

H. Correct unanticipated pressure conditions affecting dewatering system performance.

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I. Do not discontinue dewatering operations without Architect / Engineer approval.

3.7 WATER DISPOSAL

A. Discharge water into storm sewer system drainage channels tributary to settling basin.

3.8 SYSTEM REMOVAL

A. Remove dewatering and surface water control systems after dewatering operations are discontinued.

B. Remove piezometers and monitoring wells.

C. Fill abandoned wells in compliance with regulatory agency permits.

D. Cut off and cap abandoned wells minimum 36 inches below completed subgrade elevation.

E. Fill abandoned piping with grout.

F. Repair damage caused by dewatering and surface water control systems or resulting from failure of systems to protect property.

3.9 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. After dewatering system is installed, perform pumping test to determine when selected pumping rate lowers water level in well below pump intake. Adjust pump speed, discharge volume, or both to ensure proper operation of each pump.

C. Monitor and record the following daily,

1. Average discharge flow rate for each deep well, educator header, and well point.

2. Ground water elevation.

D. Monitor ground water discharge for contamination while performing pumping in vicinity of potentially contaminated sites.

END OF SECTION

SECTION 31 23 23

FILL

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Backfilling building perimeter to subgrade elevations.
2. Backfilling site structures to subgrade elevations.
3. Fill under slabs-on-grade.
4. Fill under paving.
5. Fill for over-excavation.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Concrete materials.
3. Section 31 23 16 - Excavation.
4. Section 31 23 17 - Trenching: Backfilling of utility trenches.

1.2 REFERENCES

A. ASTM International:

1. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
2. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
4. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method.
5. ASTM D6938 - Standard Test Method for Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data for geotextile fabric indicating fabric and construction.

C. Materials Source: Submit name of imported fill materials suppliers.

1.4 SUSTAINABLE DESIGN SUBMITTALS

A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:

- a. Certify source and origin for salvaged and reused products.
- b. Certify recycled material content for recycled content products.
- c. Certify source for local and regional materials and distance from Project site.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:

- a. Salvaged products.
- b. Reused products.
- c. Products with recycled material content.
- d. Local and regional products.

1.5 QUALITY ASSURANCE

A. Sustainable Design Requirements:

1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

B. Perform Work in accordance with City of Columbus Construction and Materials Specifications and the State of Ohio Standards.

PART 2 PRODUCTS

2.1 FILL MATERIALS

A. Earth Fill:

1. Clean material consisting of inorganic soil or a mixture of inorganic soil and rock, stone or gravel. The material shall be free of topsoil, sod, stumps, wood, asphalt, concrete, debris, and other deleterious material. The maximum dimension of any material shall not exceed 2-inch in any direction. Material shall have a maximum Plasticity Index of 15 and a maximum Liquid Limit of 40.

B. Granular Fill:

1. All backfill behind walls shall conform to City of Columbus Construction and

Materials Specifications Table 703.01, Size No. 57.

C. Structural Fill:

1. Clean material meeting the requirements of Item 304 as defined in the City of Columbus Construction and Materials Specifications shall be used as engineered fill under slabs, pavements and foundations.
2. 4" Trimmable, Compactible Granular Fill (Not Sand): Clean material conforming to ASTM D448 No. 10 with plenty of rock fines to be used as blotter course above the vapor retarder below interior slabs on grade.

2.2 ACCESSORIES

A. Geotextile Fabric: Non-biodegradable, non-woven.

1. Alkzo Nobel Geosynthetic Co.
2. Huesker, Inc.
3. TC Mirafi.
4. Tenax Corp.
5. Tensar Earth Technologies, Inc.
6. Or approved equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify subdrainage, dampproofing, or waterproofing installation has been inspected.
- C. Verify underground tanks are anchored to their own foundations to avoid flotation after backfilling.
- D. Verify structural ability of unsupported walls to support loads imposed by fill.

3.2 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Refer to Item 204 as defined in the City of Columbus Construction and Materials Specifications.
- C. Scarify subgrade surface.
- D. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

3.3 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Place fill material in continuous layers and compact in accordance with schedule at end of this section.
- D. Employ placement method that does not disturb or damage other work.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- G. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- H. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- I. Make gradual grade changes. Blend slope into level areas.
- J. Remove surplus backfill materials from site.
- K. Leave fill material stockpile areas free of excess fill materials.
- L. 4" layer of trimmable, compactable granular fill shall not be installed until after roof deck is in place to prevent excess water from accumulating in the blotter layer. 4" layer shall be compacted in accordance with Specification 31 23 23 Fill Areas beneath Floor Slabs.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling Within Building Areas: Plus or minus 1/2 – inch from required elevations.
- C. Top Surface of Backfilling Under Paved Areas: Plus or minus 1/2 – inch from required elevations.
- D. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform laboratory material tests in accordance with ASTM D422 and ASTM D698.

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- C. Perform in place compaction tests in accordance with ASTM D6938.
- D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- E. Frequency of Tests:

Material	Test Required	Test/Sample Frequency
Granular Fill, Structural Fill, Earth Fill	D422 Standard Test Method for Particle Size Analysis of Soils	1 test/500 cy placed
Granular Fill, Structural Fill, Earth Fill	D698 Test Method for Laboratory Compaction Characteristics of Soil	1 test/500 cy placed
Granular Fill, Earth Fill	D6938 Standard Test Method for Density of Soil and Soil Aggregate by Nuclear Methods	1 test/1000 sf placed/lift
Structural Fill	D6938 Standard Test Method for Density and Water Content of Soil and Soil Aggregate by Nuclear Methods	1 test/500 sf placed/lift

- F. Proof roll compacted fill surfaces under slabs-on-grade, and paving.

3.6 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic.

3.7 SCHEDULE

Location	Required Material	Maximum Compacted Lift Thickness	Minimum Proctor Compaction maximum dry unit weight , Standard proctor (ASTM D 698)	Minimum Relative Density (a)
Areas Beneath Footings, Floor Slabs, or Structures	Structural Fill	8"	100%	
Backfill in Trenches and Behind Walls	Granular Fill	8"	100%	75%
Turf Areas Turf and Other Planted Areas	Earth Fill	10"	90%	50%

- (a) Minimum relative density as determined by ASTM D-4253 for coarse-grained soils with less than 15% by mass passing the No. 200 sieve. Applicable only when minimum proctor compaction cannot be achieved.

END OF SECTION

SECTION 31 25 13

EROSION CONTROLS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

2. Rock Energy Dissipator.

3. Rock Barriers.

B. Related Sections:

1. Section 03 10 00 - Concrete Forming and Accessories.

2. Section 03 20 00 - Concrete Reinforcing.

3. Section 03 30 00 - Cast-In-Place Concrete.

4. Section 04 05 03 - Masonry Mortaring and Grouting.

5. Section 07 90 00 - Joint Protection.

6. Section 31 10 00 - Site Clearing.

7. Section 31 23 16 - Excavation.

8. Section 31 23 23 - Fill.

9. Section 31 37 00 - Riprap.

10. Section 32 13 13 - Concrete Paving.

11. Section 32 91 19 - Landscape Grading.

12. Section 32 92 00 – Turf and Wet Detention Basin Seed.

1.2 PERMITS & NOTIFICATIONS

A. Obtain all local, state, and federal permits and pay all plan review and permit fees and deposits required for the Work specified herein.

B. Perform all Work in accordance with the aforementioned permits.

1.3 REFERENCES

A. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.

B. ASTM International:

1. ASTM C127 - Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
2. ASTM D698 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)).
3. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
4. ASTM D6938 - Standard Test Method for Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

C. Precast/Prestressed Concrete Institute:

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

1.4 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Product Data: Submit data on joint filler, joint sealer, admixtures, geotextile.

C. Submit proposed mix design of each class of concrete for review prior to commencement of Work.

D. Samples:

1. Submit two samples of rock, minimum 5 tons each or one half total project quantity, whichever is smaller. Provide one sample in place at construction site and provide other sample at quarry. Construction site sample may be incorporated into the Work. Samples will be used as reference for judging size, and gradation of rock supplied and placed.

E. Test Reports: Indicate certified test results for precast concrete at manufacturing facility, cast-in-place concrete in field, and granular backfill.

F. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.5 SUSTAINABLE DESIGN SUBMITTALS

A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.

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b. Certify source for local and regional materials and distance from Project site.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:

a. Products with recycled material content.

b. Local and regional products.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.

1.7 QUALITY ASSURANCE

A. Perform Work in accordance with requirements of Section 31 23 23, Section 31 10 00, Section 31 23 16, Section 31 23 23, Section 31 37 00, Section 32 13 13, Section 32 91 19, Section 32 92 00, Section 03 10 00, Section 03 20 00, Section 03 30 00.

B. Sustainable Design Requirements:

1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

C. Perform Work in accordance with City of Columbus Construction and Materials Specification and State of Ohio Standards.

1.8 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum two week prior to commencing work of this section.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not place grout when air temperature is below freezing.

C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

PART 2 PRODUCTS

2.1 ROCK AND GEOTEXTILE MATERIALS

A. Furnish materials in accordance with the City of Columbus Construction and Materials Specifications Section 712.

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2.2 BLOCK, STONE, AGGREGATE, AND SOIL MATERIALS

- A. Precast Solid Concrete Block: As specified in Section 32 32 23.
- B. Stone: As specified in Section 31 23 23.
- C. Coarse Aggregate: Type as specified in Section 31 23 23.
- D. Earth Backfill: Soil Type as specified in Section 31 23 23.

2.3 PLANTING MATERIALS

- A. Seeding and Soil Supplements: As specified in Section 32 92 00.
- B. Mulch: As specified in Section 32 92 00.

2.4 PIPE MATERIALS

- A. Pipe: As specified in Section 33 41 00 or as required by the City of Columbus.

2.5 ACCESSORIES

- A. Joint Sealers: As specified in Section 07 90 00.
- B. Joint Filler: As specified in Section 07 90 00.
- C. Building Paper: Furnish in accordance with the City of Columbus Construction and Materials Specifications and the Standard Specifications for Highway Construction in Ohio.
- D. Grout: As specified in Section 04 05 03.
- E. Steel Plate Anti-Vortex Device: Furnish in accordance with the City of Columbus Construction and Materials Specifications and the Standard Specifications for Highway Construction in Ohio.
- F. Welding Material: Furnish in accordance with the City of Columbus Construction and Materials Specifications and the Standard Specifications for Highway Construction in Ohio.
- G. Anti-Seep Collar: Furnish in accordance with the City of Columbus Construction and Materials Specifications and the Standard Specifications for Highway Construction in Ohio.
- H. Trash Rack: Furnish in accordance with the City of Columbus Construction and Materials Specifications and the Standard Specifications for Highway Construction in Ohio.

2.6 MIXES

- A. Concrete: As specified in Section 03 30 00.

2.7 SOURCE QUALITY CONTROL (AND TESTS)

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Perform tests on cement, aggregates, and mixes to ensure conformance with specified requirements.
- C. Test samples in accordance with ACI 301.
- D. Make rock available for inspection at producer's quarry prior to shipment. Notify Owner at least seven days before inspection is allowed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted subgrade, granular base, and stabilized soil is acceptable and ready to support devices and imposed loads.
- C. Verify gradients and elevations of base or foundation for other work are correct.

3.3 ROCK ENERGY DISSIPATOR

- A. Excavate to nominal placement thickness. Remove loose, unsuitable material below bottom of rock lining, then replace with suitable material. Thoroughly compact and finish entire foundation area to firm, even surface.
- B. Lay and overlay geotextile fabric over substrate. Lay fabric parallel to flow from upstream to downstream. Overlap edges upstream over downstream and upslope over downslope. Provide a minimum overlap of 3 feet. Offset adjacent roll ends a minimum of 5 feet when lapped. Cover fabric as soon as possible and in no case leave fabric exposed more than 4 weeks.
- C. Carefully place rock on geotextile fabric to produce an even distribution of pieces, with minimum of voids and without tearing geotextile.
- D. Unless indicated otherwise, place full course thickness in one operation to prevent segregation and to avoid displacement of underlying material. Arrange individual rocks for uniform distribution.
- E. Install Work in accordance with Municipality of Columbus Ohio Public Work's standards.

3.4 ROCK BARRIER

- A. Determine length required for ditch or depression slope and excavate, compact and foundation area to firm, even surface.
- B. Produce an even distribution of rock pieces, with minimum voids to the indicated shape, height and slope.

C. Install Work in accordance with Municipality of Columbus, Ohio Public Work's standards.

3.7 SITE STABILIZATION

A. Incorporate erosion control devices indicated on the Drawings into the Project at the earliest practicable time.

B. Construct, stabilize and activate erosion controls before site disturbance within tributary areas of those controls.

C. Stockpile and waste pile heights shall not exceed 20 feet. Slope stockpile sides at 2: 1 or flatter.

D. Stabilize any disturbed area of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.

1. During non-germinating periods, apply mulch at recommended rates.

2. Stabilize disturbed areas which are not at finished grade and which will be disturbed within one year in accordance with Section 32 92 00 at 50 percent of permanent application rate with no topsoil.

3. Stabilize disturbed areas which are either at finished grade or will not be disturbed within one year in accordance with Section 32 92 00 permanent seeding specifications.

E. Stabilize diversion channels, sediment traps, and stockpiles immediately.

3.8 FIELD QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Inspect erosion control devices on a weekly basis and after each runoff event. Make necessary repairs to ensure erosion and sediment controls are in good working order.

C. Compaction Testing: As specified in Section 31 23 23.

D. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

E. Frequency of Compaction Testing: Two for each lift.

3.9 CLEANING

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.

B. When sediment accumulation in sedimentation structures has reached a point one-third depth of sediment structure or device, remove and dispose of sediment.

C. Do not damage structure or device during cleaning operations.

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1 D. Do not permit sediment to erode into construction or site areas or natural waterways.

2 E. Clean channels when depth of sediment reaches approximately one half channel depth.

3 3.10 PROTECTION

4 A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting
5 finished Work.

6 B. Immediately after placement, protect paving from premature drying, excessive hot or cold
7 temperatures, and mechanical injury.

8 C. Do not permit construction traffic over paving until 75 percent design strength of concrete
9 has been achieved.

10 D. Protect paving from elements, flowing water, or other disturbance until curing is
11 completed.

12 END OF SECTION

SECTION 31 37 00

RIPRAP

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Riprap placed loose.

B. Related Sections:

1. Section 31 22 13 - Rough Grading.
2. Section 31 23 16 - Excavation: Excavating for riprap.
3. Section 31 23 17 - Trenching
4. Section 31 23 23 - Fill.
5. Section 31 25 13 - Erosion Controls

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit data for riprap bags, binder and geotextile fabric.

C. Manufacturer's Certificate: Certify riprap meet or exceed specified requirements.

1.3 SUSTAINABLE DESIGN SUBMITTALS

A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.
- b. Certify source for local and regional materials and distance from Project site.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:

- a. Products with recycled material content.

b. Local and regional products.

1.4 QUALITY ASSURANCE

A. Furnish each aggregate material from single source throughout the Work.

B. Sustainable Design Requirements:

1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

C. Perform Work in accordance with City of Columbus Construction and Materials Specifications and the State of Ohio Standards.

PART 2 PRODUCTS

2.1 MATERIALS

A. Furnish materials in accordance with City of Columbus Construction and Materials Specification and State of Ohio standards for Medium Riprap.

B. Underlying geotextile shall conform to section 32 92 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

3.2 PLACEMENT

A. Place geotextile fabric over substrate, lap edges and ends.

B. Place riprap as indicated on Drawings.

C. Installed Thickness: As scheduled in this section.

3.3 SCHEDULES

B. Curb flumes: Individual rip-rap units, 12 inch thickness.

END OF SECTION

SECTION 32 11 23

AGGREGATE BASE COURSES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aggregate base course.

B. Related Sections:

1. Section 31 22 13 - Rough Grading: Preparation of site for base course.
2. Section 31 23 17 - Trenching: Compacted fill under base course.
3. Section 31 23 23 - Fill: Compacted fill under base course.
4. Section 31 37 00 - Riprap.
5. Section 32 12 16 - Asphalt Paving: Binder and finish asphalt courses.
6. Section 32 13 13 - Concrete Paving: Finish concrete surface course.
8. Section 32 91 19 - Landscape Grading: Topsoil fill at areas adjacent to aggregate base course.

1.2 PERMITS & NOTIFICATIONS

- A. Obtain all local, state, and federal permits and pay all plan review and permit fees and deposits required for the Work specified herein.

- B. Perform all Work in accordance with the aforementioned permits.

1.3 REFERENCES

A. ASTM International:

1. ASTM D422 - Standard Test Method for Particle Size Analysis of Soils
2. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (6,000 ft-lbf/ft³ (2,700 kN-m/m³)).
3. ASTM D6938 - Standard Test Method for Density and Water Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

1 B. Materials Source: Submit name of aggregate materials suppliers.

2 C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

3 1.5 SUSTAINABLE DESIGN SUBMITTALS

4 A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design
5 submittals.

6 B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design
7 requirements.

8 1. Materials Resources Certificates:

9 a. Certify source and origin for salvaged and reused products.

10 b. Certify recycled material content for recycled content products.

11 c. Certify source for local and regional materials and distance from Project
12 site.

13 C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable
14 design requirements. Exclude cost of labor and equipment to install products.

15 1. Provide cost data for the following products:

16 a. Salvaged products.

17 b. Reused products.

18 c. Products with recycled material content.

19 d. Local and regional products.

20 1.6 QUALITY ASSURANCE

21 A. Furnish each aggregate material from single source throughout the Work.

22 B. Sustainable Design Requirements:

23 1. Regional Materials: Furnish materials extracted, processed, and manufactured
24 within 500 miles of Project site.

25 C. Perform Work in accordance with City of Columbus Construction and Materials
26 Specifications and the State of Ohio Standards.

27 PART 2 PRODUCTS

28 2.1 AGGREGATE MATERIALS

29 A. Base Coarse Aggregate: Material shall meet the requirements as defined in Item 304 and
30 703 of the City of Columbus Construction and Materials Specifications for Aggregate
31 Base.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

3.2 PREPARATION

- A. Strip and reuse suitable existing aggregate base to the extent feasible.
- B. Do not place fill on soft, muddy or frozen surfaces.
- C. Verify compacted substrate is dry and ready to support paving and imposed loads.
 - 1. Use a fully loaded tandem axle dump truck or rubber tire vehicle of similar size and weight (typically 9-ton per axle). Test shall be conducted with “tag” or “pusher” axles retracted from the ground.
 - 2. Proof roll substrate with a minimum two passes to identify soft spots.
 - 3. Remove soft substrate and replace with compacted Breaker Run Aggregate as specified in Section 31 23 23.
 - 4. Maintain records and photographs to document all proof roll testing and undercut areas.
- D. Verify substrate has been inspected, gradients and elevations are correct.
- E. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- F. Protect proof rolled areas from saturation and other damage.

3.3 AGGREGATE PLACEMENT

- A. Spread aggregate over prepared substrate to total compacted thickness indicated on Drawings.
- B. Roller compact aggregate to 95 percent maximum density.
- C. Level and contour surfaces to elevations, profiles, and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.
- E. Maintain optimum moisture content of fill materials to attain specified compaction density.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Flat Surface: 1/4 inch measured with 10 foot straight edge.
- C. Maximum Variation From Thickness: 1/4 inch.
- D. Maximum Variation From Elevation: 1/4 inch.

3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements 01 70 00 - Execution and Closeout Requirements:
Field inspecting, testing, adjusting, and balancing.
- B. Compaction testing will be performed in accordance with ASTM D6938.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.
- D. Frequency of Tests: One test for every 500 square yards compacted aggregate.

3.6 COMPACTION

- A. Compact materials to 98 percent of maximum density as determined from test strip, in accordance with ASTM D2940.

END OF SECTION

SECTION 32 13 13

CONCRETE PAVING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Aggregate subbase .
2. Concrete paving for:
 - b. Concrete stair steps.
 - c. Concrete integral curbs and gutters.
 - d. Concrete parking areas and roads.
 - e. Equipment Pads

B. Related Sections:

1. Section 03 30 00 – Cast-in-Place Concrete
2. Section 07 90 00 - Joint Protection: Sealant for joints.
3. Section 09 90 00 - Painting and Coating: Pavement markings.
4. Section 31 22 13 - Rough Grading: Preparation of site for paving and base.
5. Section 31 23 23 - Fill: Compacted subbase for paving.
6. Section 32 11 23 - Aggregate Base Courses.
7. Section 32 17 13 - Parking Bumpers: Precast concrete parking bumpers.
8. Section 32 91 19 - Landscape Grading: Preparation of subsoil at pavement perimeter.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials:

1. AASHTO M324 - Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements.

B. American Concrete Institute:

1. ACI 301 - Specifications for Structural Concrete.
2. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

C. ASTM International:

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1. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
2. ASTM A185/A185M - Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.
3. ASTM A497/A497M - Standard Specification for Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement.
4. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
5. ASTM A706/A706M - Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
6. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.
7. ASTM A775/A775M - S Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
8. ASTM A884/A884M - Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement.
9. ASTM A934/A934M - Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars.
10. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
11. ASTM C33 - Standard Specification for Concrete Aggregates.
12. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
13. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
14. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
15. ASTM C150 - Standard Specification for Portland Cement.
16. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
17. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
18. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
19. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.

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- 1 20. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds
2 for Curing Concrete.
- 3 21. ASTM C494/C494M - Standard Specification for Chemical Admixtures for
4 Concrete.
- 5 22. ASTM C595 - Standard Specification for Blended Hydraulic Cements.
- 6 23. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined
7 Natural Pozzolan for Use as a Mineral Admixture in Concrete.
- 8 24. ASTM C979 - Standard Specification for Pigments for Integrally Colored
9 Concrete.
- 10 25. ASTM C989 - Standard Specification for Ground Granulated Blast-Furnace Slag
11 for Use in Concrete and Mortars.
- 12 26. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use
13 in Producing Flowing Concrete.
- 14 27. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed
15 Hydraulic-Cement Concrete.
- 16 28. ASTM C1116 - Standard Specification for Fiber-Reinforced Concrete and
17 Shotcrete.
- 18 29. ASTM C1315 - Standard Specification for Liquid Membrane-Forming
19 Compounds Having Special Properties for Curing and Sealing Concrete.
- 20 30. ASTM C1371 - Standard Test Method for Determination of Emittance of Materials
21 Near Room Temperature Using Portable Emissometers.
- 22 31. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance
23 Near Ambient Temperature Using a Portable Solar Reflectometer.
- 24 32. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for
25 Concrete Paving and Structural Construction (Nonextruding and Resilient
26 Bituminous Types).
- 27 33. ASTM D1752 - Standard Specification for Preformed Sponge Rubber and Cork
28 Expansion Joint Fillers for Concrete Paving and Structural Construction.
- 29 34. ASTM D6690 - Standard Specification for Joint and Crack Sealants, Hot Applied,
30 for Concrete and Asphalt Pavements.
- 31 35. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces
32 Using Inspection-Meter Techniques.
- 33 36. ASTM E903 - Standard Test Method for Solar Absorptance, Reflectance, and
34 Transmittance of Materials Using Integrating Spheres.
- 35 37. ASTM E1918 - Standard Test Method for Measuring Solar Reflectance of

Horizontal and Low-Sloped Surfaces in the Field.

38. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.

1.3 PERFORMANCE REQUIREMENTS

- A. Paving: Designed movement of trucks up to 80,000 lbs.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

- B. Product Data:

1. Submit data on concrete materials, joint filler, admixtures, and curing compounds.
2. Submit samples not less than 12"x12" in size of sand blast finish, indicating materials and methods used to produce the sand blast finish. Review by Engineer will be for texture only. Approved samples will become the Engineer's control samples.
3. Submit 1-quart size sample of exposed aggregate for review and acceptance.
4. Submit shop drawings of P&H logo void-form to be used in sand-blasting operations for approval by Owner. Shop drawings shall depict all dimensions of form.

- C. Design Data:

1. Submit concrete mix design for each concrete strength.
2. Submit separate mix designs when admixtures are required for hot and cold weather concrete work.
3. Identify mix ingredients and proportions, including admixtures.
4. Identify chloride content of admixtures and whether or not chloride was added during manufacture.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Sustainable Sites Certificates:

- a. Certify paving materials solar reflectance index.

2. Materials Resources Certificates:

- a. Certify recycled material content for recycled content products.
- b. Certify source for local and regional materials and distance from Project site.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:

- a. Products with recycled material content.
- b. Local and regional products.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ACI 301 and the requirements of Section 03 10 00, Section 03 20 00, and Section 03 30 00.

B. Obtain cementitious materials from same source throughout.

C. Sustainable Design Requirements:

- 1. Recycled Content Materials: Preference should be given to materials with recycled content.
- 2. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

D. Perform Work in accordance with City of Columbus Construction and Materials Specifications and the State of Ohio Standards.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum five years experience.

B. Installer: Company specializing in performing work of this section with minimum five years experience.

1.8 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.

B. Do not place concrete when base surface temperature is less than 40 degrees F, or surface

is wet or frozen.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Form Materials: Conform to ACI 301 and as specified in Section 03 10 00.
- B. Steel form material, profiled to suit conditions.
- C. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick.

2.2 REINFORCING

- A. Welded Deformed Wire Fabric: ASTM A497/A497M; in flat sheets, unfinished.
- B. Dowels: ASTM A615/A615M; 60 ksi yield strength, plain steel bars; cut to length indicated on Drawings, square ends with burrs removed; epoxy coated finish.
- C. Tie Wire: Minimum 16 gage annealed type.
- D. Epoxy Coating Patching Material: Type as recommended by coating manufacturer.

2.3 CONCRETE MATERIALS

- A. Concrete Materials: As specified in Section 03 30 00, City of Columbus Construction and Materials Specifications and the State of Ohio standards.
 - 1. Concrete Curbs
 - 2. Concrete Pavements
- B. Fine and Coarse Aggregates: ASTM C33.
 - 1. Coarse Aggregate Maximum Size: 3/4 inches.
- C. Water: ASTM C94/C94M; potable, without deleterious amounts of chloride ions.
- D. Air Entrainment: ASTM C260.
- E. Chemical Admixture: ASTM C494/C494M.
- F. Fly Ash: ASTM C618 Class C or F.
- G. Slag: ASTM C989; Grade 100 or 120; ground granulated blast furnace slag.
- H. Plasticizing: ASTM C1017/C1017M Type I, plasticizing.

2.4 ACCESSORIES

- A. Membrane Curing Compound: ASTM C309.

1 B. Joint Sealers: Specified in Section 07 90 00

2 2.5 CONCRETE MIX - BY PERFORMANCE CRITERIA

3 A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM
4 C94/C94M

5 B. Paving Surfaces: Minimum solar reflectance index (SRI) of 29, calculated in accordance
6 with ASTM E1980.

7 1. Reflectance: Measured in accordance with ASTM E903, ASTM E1918, or ASTM
8 C1549.

9 2. Emittance: Measured in accordance with ASTM E408 or ASTM C1371.

10 C. Select proportions for normal weight concrete in accordance with ACI 301.

11 D. Provide concrete to the following criteria:

12 1. Compressive Strength: 4000 psi at 28 days.

13 2. Slump: 2.5 to 4 inches. Tolerance in slump shall not exceed ACI recommendations.

14 3. Minimum Cementitious Materials Content: 6.5 sacks/cu yd.

15 4. Maximum Water/Cement Ratio: 0.40

16 5. Air content: 6.5 percent +/- 1.5 percent.

17 E. Limit the following cementitious materials to maximum percentage by mass of all
18 cementitious materials:

19 1. Fly Ash: 15 percent.

20 2. Blast Furnace Slag: 30 percent.

21 3. Fly Ash and Blast Furnace Slag: 30 percent.

22 F. Use accelerating admixtures in cold weather only when approved by the
23 Architect/Engineer in writing. Use of admixtures will not relax cold weather placement
24 requirements.

25 G. Use calcium chloride only when approved by the Architect/Engineer in writing.

26 H. Use set retarding admixtures during hot weather only when approved by the
27 Architect/Engineer in writing.

28 2.6 FABRICATION

29 A. Fabricate reinforcing in accordance with State of Ohio Highway standards.

30 B. Form standard hooks.

2.7 SHOP FINISHING - REINFORCING

- A. Epoxy Coated Finish for Steel Bars: ASTM A775/A775M.

2.8 SOURCE QUALITY CONTROL AND TESTS

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services: Provide mix design for curbs, sidewalks, and pavements.
- B. Submit proposed mix design to appointed firm for review prior to commencement of Work.
- C. Tests on cement, aggregates, and mixes will be performed to ensure conformance with specified requirements.
- D. Test samples in accordance with ASTM C94/C94M

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify gradients and elevations of base are correct.

3.2 BASE COURSE

- A. Aggregate Base Course: Install as specified in Section 32 11 23.

3.3 PREPARATION

- A. Moisten substrate to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole and inlet frames with oil to prevent bond with concrete paving.
- C. Notify the Owners a minimum 24 hours prior to commencement of concreting operations.

3.4 FORMING

- A. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Rigidly support and substantially construct forms. Erect forms plumb, straight and true to line, shape and dimensions, in precise position to form the lines and designs indicated.
- D. Forms for exterior concrete work shall be set directly in contact with prepared subgrade or base which shall be compacted for a sufficient distance outside the area of the pavement to support the form.
- E. Coat surfaces of forms coming in contact with newly placed concrete with a non-staining form oil, a commercial form release agent or a non-absorptive form liner to prevent

moisture penetration of the form and to prevent bond with the concrete.

3.5 REINFORCING

- A. Place reinforcing at mid-height of paving unless otherwise shown on the Drawings.
- B. Interrupt reinforcing at expansion joints.
- C. Place reinforcement to achieve paving and curb alignment.
- D. Avoid splices in areas of maximum stress.

3.6 PLACING CONCRETE

- A. Handle concrete from the mixer to the place of final deposit as rapidly as practicable, by methods which will prevent the separation or loss of the ingredients.
- B. Deposit concrete as nearly as possible to its final position to avoid remanding.
- C. Place concrete in accordance with ACI 301.
- D. Place concrete using the slip form technique.
- E. Ensure reinforcing, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
- F. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- G. Pour to slopes, elevations and profiles required and accurately pitch to drain.
- H. Exterior sidewalk and slab thickness to be as shown on drawings or match adjacent existing if thickness not shown on drawings.
- I. Stamping of contractor's name in concrete flatwork is not permitted.

3.7 JOINTS

- A. Place and construct joints as indicated on the Drawings.
- B. Seal joints as indicated on Drawings in accordance with Section 07 90 00.

3.8 FINISHING

- A. Paving: Light broom.
- C. Curbs and Gutters: Light broom.
- D. Direction of Texturing: Transverse to paving direction.
- E. Place membrane on exposed concrete surfaces immediately after finishing.

3.9 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. Follow applicable provisions of ACI 301.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure concrete floor surfaces as specified in Section 03 39 00.
- D. When the work is completed remove surplus and waste material, debris, rubbish, equipment and implements from the site and leave the work in a clean, neat acceptable condition.

3.10 COLD WEATHER CONCRETING AND HOT WEATHER CONCRETING

- A. Complete cold weather concreting in accordance with ACI 306.
- B. Complete hot weather concreting in accordance with ACI 305.
- C. All work, equipment and materials required for cold or hot weather concreting shall be considered incidental to the contract work.

3.11 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.
- C. Maximum Variation From True Position: 1/4 inch.

3.12 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Perform field testing in accordance with ACI 301.
- C. Inspect reinforcing placement for size, spacing, location, support.
- D. Strength Test Samples:
 - 1. Sampling Procedures: ASTM C172.
 - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured.
 - 3. Sample concrete and make one set of three cylinders for every 75 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area paving.
 - 4. Make one additional cylinder during cold weather concreting, and field cure.

E. Field Testing:

1. Slump Test Method: ASTM C143/C143M.
2. Air Content Test Method: ASTM C173/C173M.
3. Temperature Test Method: ASTM C1064/C1064M.
4. Measure slump and temperature for each compressive strength concrete sample.
5. Measure air content in air entrained concrete for each compressive strength concrete sample.

F. Cylinder Compressive Strength Testing:

1. Test Method: ASTM C39/C39M.
2. Test Acceptance: In accordance with State of Ohio Highway standards.
3. Test one cylinder at 7 days.
4. Test two cylinders at 28 days.
5. Dispose remaining cylinders when testing is not required.

G. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

H. Variation from Indicated Elevation Testing (Sidewalks excluded):

1. Within 48-hours following the installation, the Contractor shall perform survey and provide to the Owner as-built pavement surface elevations tied to benchmarks shown on the site survey.
2. Surface elevations in parking areas/lots shall be provided on a 25-foot grid, at all drainage structures, and where directed by the Owner.
3. Surface elevations in roadways shall be provided in 50-foot stations at the centerline, at both edges of pavement, at all drainage structures, and where directed by the Owner.
4. Installed pavement thickness shall be within 1/2 inch of the indicated elevation on the plans.

3.13 PROTECTION

- A. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- B. Do not permit vehicular traffic over paving for 7 days minimum after finishing until 75 percent design strength of concrete has been achieved.

END OF SECTION

SECTION 32 91 13

SOIL PREPARATION

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparation of subsoil.

2. Soil testing.

3. Placing topsoil.

B. Related Sections:

1. Section 31 22 13 – Rough Grading: Rough grading of site.

2. Section 31 23 17 – Trenching: Rough grading over cut.

3. Section 32 91 19 – Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.

4. Section 32 92 00 – Turf and Wet Detention Basin Seed

5. Section 32 93 00 – Plants.

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Product Data: For each type of product indicated, including soils.

1. Lime

2. Sulfur

3. Compost

4. Fertilizer

5. Topsoil

6. Sand

C. Provide copies of all quality assurance testing reports.

1.3 SUSTAINABLE DESIGN SUBMITTALS

A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design

submittals.

B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:

a. Certify source for local and regional materials and distance from Project site.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:

a. Local and regional products.

1.4 QUALITY ASSURANCE

A. Sustainable Design Requirements: The Contractor shall retain the services of an independent testing firm to conduct testing and analysis of salvaged and imported soil and amendments as required by this section and elsewhere in the Contract Documents. The materials testing consulting A/E shall be subject to approval by the CMT.

B. The Landscape Contractor is responsible for collection of soil specimens and shall be completed in accordance with accepted practices, and shall be subject to approval by the CMT.

C. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site

D. Perform Work in accordance with City of Columbus requirements, Construction and Materials Specifications, and the State of Ohio Standards.

E. The contractor's testing firm shall complete materials testing as outlined in Table 329113-1:

TABLE 0329113-1

Material	Test Required	Test/Sample Frequency
Imported Topsoil	USDA soil texture classification, pH, % organic matter, nutrient content	1 test/200 cy imported

1.5 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.

PART 2 PRODUCTS

2.1 TOPSOIL

- A. Clean, salvaged, or imported material capable of passing the 1" sieve and meeting the requirements of Section 653.02 of the City of Columbus Construction and Materials Specifications. The material shall be free of rocks, gravel, wood, debris, and of noxious weeds and their seeds.
- B. Conduct soil test to verify that topsoil complies with above standards. Amend and retest until topsoil standards are met. Submit all tests to CMT. Further amend topsoil as recommended by soil test for type of planting indicated.
- C. Additional Properties of Imported Topsoil or Manufactured Topsoil: Screened and free of stones ½ inch or larger in any dimension; free of roots, plants, sod, clods, clay lumps, pockets of coarse sand, paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, building debris, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, acid, and other extraneous materials harmful to plant growth; free of obnoxious weeds and invasive plants including quackgrass, Johnsongrass, poison ivy, nutsedge, nimblewill, Canada thistle, bindweed, bentgrass, wild garlic, ground ivy, perennial sorrel, and brome grass; not infested with nematodes; grubs; or other pests, pest eggs, or other undesirable organisms and disease-causing plant pathogens; friable and with sufficient structure to give good tilth and aeration. Continuous, air-filled pore space content on a volume/volume basis shall be at least 15 percent when moisture is present at field capacity. Soil shall have a field capacity of at least 15 percent on a dry weight basis.

2.2 INORGANIC SOIL AMENDMENTS

- A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - 1. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
 - 2. Provide lime in form of ground dolomitic limestone.
- B. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.
- C. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

2.3 ORGANIC SOIL AMENDMENTS

- A. Compost is a widely used bulk organic soil amendment and a recycled product.
 - 1. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 3/4-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows;

a. Organic Matter Content: 50 to 60 percent of dry weight.

2. Compost meeting Ohio Department of Transportation Construction and Material Specification Section 659.06.

2.4 FERTILIZERS

A. Granular, non-burning product composed of not less than fifty (50) percent organic slow-acting, guaranteed analysis professional fertilizer. Commercial fertilizer shall conform to Ohio Department of Transportation Construction and Material Specification Section 659.04, and meet the standards of the Ohio Department of Agriculture as to registration and labeling. Fertilizer composition as recommended by soil test results.

1. All fertilizers shall be delivered fully labeled according to applicable regulations, bearing name, trade name, or trademark of producer, along with the producer's warranty. Application amounts of fertilizer and lime or sulfur will be governed by the recommendations of the soil test.

2. All fertilizer use and application shall comply with the local ordinances.

2.5 PLANTING SOILS

A. Topsoil (imported or suitable stockpiled topsoil) and amendment mixture for use in all planting beds and for all areas to be seeded as indicated on drawings:

1. 3 parts topsoil

2. 1 part compost

3. Other amendments and fertilizers as recommended by the soil test results, to adjust pH, or as specified in "Plants" or "Turf and Wet Detention Basin Seed" Sections.

B. Thoroughly blend planting soil mix off-site before spreading.

C. Final planting soil mix is subject to approval by CMT.

2.6 SOURCE QUALITY CONTROL

A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.

B. Analyze to ascertain percentage of nitrogen, phosphorus, potash, soluble salt content, organic matter content, and pH value.

C. Provide recommendation for fertilizer and lime application rates for specified seed mix as result of testing.

D. Testing is not required when recent tests and certificates are available for imported topsoil. Submit these test results to testing laboratory. Indicate, by test results, information necessary to determine suitability.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify prepared soil base is ready to receive the Work of this section.

3.2 PREPARATION OF SUBSOIL

A. Prepare sub-soil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove all vegetation as needed with broad spectrum herbicide such as Round-Up. Remove all rocks, debris, and litter that will prevent compliance with "Plants" and "Turf and Wet Detention Basin Seed" Specifications. Final grade area to within 2" of subgrade elevation.

C. Rip, fracture, or disc the subsoil to a depth of 12" to 18" to allow aeration.

3.3 PLACING TOPSOIL

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by topsoil spreading operations.

B. Place topsoil to achieve final grades indicated on the Drawings, allowing for settlement.

1. Place in 6" depths, amended per soil test recommendations in all seeded and sodded areas.

2. If topsoil has been deemed acceptable by a soil test, no amendments are needed.

3. If amendments are needed, uniformly apply organic matter, fertilizer, or other soil amendments to soil surface, and incorporate into the top 4" to 6" of soil by tilling or disking. Alternatively, topsoil and amendments may be batch blended uniformly off-site and transported to site pre-amended.

C. Planting Soil: Place Planting Soil prepared as in Part 2 in minimum 12" depth in all planting beds.

D. Do not apply topsoil or planting soil to saturated or frozen subgrades.

E. Stockpile any additional amended Planting Soil on site for fine grading operations, to repair areas which may settle, and to backfill planting holes if additional topsoil material is needed.

3.4 ORGANIC SOIL AMENDMENTS AND PH ADJUSTMENT

A. Provide organic soil amendments and lime or sulfur as recommended by the soil analysis testing.

1 3.5 FERTILIZER

2 A. Fertilizer shall be applied in accordance with the requirements of Section 659.04 of the
3 Ohio Department of Transportation Construction and Material Specification and Columbus
4 local ordinances.

5 END OF SECTION

SECTION 32 91 19

LANDSCAPE GRADING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Final grade topsoil for finish landscaping.

B. Related Sections:

1. Section 31 22 13 – Rough Grading: Site contouring.
2. Section 31 23 17 – Trenching: Backfilling trenches.
3. Section 31 23 23 – Fill: Backfilling at building areas.
4. Section 32 91 13 – Soils Preparation.
5. Section 32 92 00 – Turf and wet detention basin seed.
6. Section 32 93 00 – Plants

1.2 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Submittal procedures

B. Materials Source: Submit name of imported materials source.

C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

1.3 SUSTAINABLE DESIGN SUBMITTALS

A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.

B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:

- a. Certify source for local and regional materials and distance from Project site.

C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:

a. Local and regional products.

1.4 QUALITY ASSURANCE

A. Furnish each topsoil material from single source throughout the Work.

B. Sustainable Design Requirements:

1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

C. Perform Work in accordance with City of Columbus requirements, Construction and Materials Specifications, and the State of Ohio Standards.

PART2 PRODUCTS

2.1 MATERIAL

A. Topsoil: Fill Type as specified in Section 32 91 13.

PART 3 EXECUTION

3.1 EXAMINATION

A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

B. Verify building and trench backfilling have been inspected.

C. Verify substrate base has been contoured and compacted.

3.2 PREPARATION

A. Protect landscaping and other features remaining as final Work.

B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

3.3 SUBSTRATE PREPARATION

A. Eliminate uneven areas and low spots.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove contaminated subsoil.

C. Scarify surface where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.4 PLACING TOPSOIL

A. Place topsoil in areas where seeding, sodding, and planting, is required to nominal depth of 6 inches. Place topsoil during dry weather.

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B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.

C. Remove roots, weeds, rocks, and foreign material while spreading.

D. Manually spread topsoil close to plant material, building, to prevent damage.

E. Lightly compact placed topsoil.

F. Remove surplus subsoil and topsoil from site.

3.5 TOLERANCES

A. Section 01 40 00 - Quality Requirements: Tolerances.

B. Top of Topsoil: Plus or minus 1/2 inch.

3.6 PROTECTION OF INSTALLED WORK

A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.

B. Prohibit construction traffic over topsoil.

3.7 SCHEDULES

A. Compacted topsoil thicknesses:

1. Seeded Grass: 6 inches.

2. Shrub Beds: 18 inches.

END OF SECTION

SECTION 32 92 00

TURF SEED

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. Turf Seed.
3. Erosion-control material(s).

B. Related Sections:

1. Section 31 22 13 – Rough Grading: Rough grading of site.
2. Section 32 91 13 – Soil Preparation.
3. Section 32 91 19 – Landscape Grading.
4. Section 32 93 00 – Plants.

C. DEFINITIONS

1. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
2. Finish Grade: Elevation of finished surface of planting soil.
3. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
4. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
5. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
6. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with

soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

7. Subgrade: Surface or elevation of subsoil remaining after excavation is complete or top surface of a fill or backfill before planting soil is placed.

8. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

9. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Pesticides and Herbicides: Include product label and manufacturer's application instructions specific to this Project.

2. Certification of Seed: From seed vendor for each seed monostand or mixture stating the botanical and common name, percentage by weight of each species and variety, and percentage of purity, germination, and weed seed. Include the year of production and date of packaging.

B. Qualification Data for firms and persons specified in the Quality Assurance Article to demonstrate their capabilities and experience. Include list of completed projects with project names and address of architects and owners, and other information specified.

C. Product Certificates: For all seed, soil amendments and fertilizers, from manufacturer.

D. Material Test Reports: For standardized ASTM D 5268 topsoil, existing native surface topsoil, existing in-place surface soil, and imported or manufactured topsoil.

E. Planting schedule indicating anticipated dates and locations for each type of planting.

F. Maintenance Instructions: Recommended procedures to be established by Owner for maintenance of turf and wet detention seed during a calendar year. Submit before expiration of required initial maintenance periods.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer who has completed landscaping work similar in material, design, and extent to that indicated for this Project and with a record of successful landscape establishment.

1. Experience: Five years' experience in turf installation in addition to requirements in Division 01 Section "Quality Requirements."

2. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

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3. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
4. Pesticide Applicator: State licensed, commercial.
5. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.
6. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; sodium absorption ratio; deleterious material; pH; and mineral and plant-nutrient content of the soil.
7. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
8. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.
9. Report suitability of tested soil for turf and wet detention seed growth.
10. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd. for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - a. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.
11. Pre-installation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable. Store any seed delivered prior to use in a manner safe from damage from heat, moisture, rodents, or other causes of degradation. Any seed damaged after acceptance shall be replaced by the Contractor at no cost to the Owner.
- B. Bulk Materials:
 1. Do not dump or store bulk materials near structures, utilities, walkways and

pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.

3. Accompany each delivery of bulk fertilizers with appropriate certificates.

1.6 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of planting completion.

1. Turf Planting

a. After May 15th.

b. Before October 15th.

3. Dormant seeding is allowed under this specification.

4. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

5. Utilities: Determine location of above grade and underground utilities and perform work in a manner which will avoid damage. Hand excavate, as required. Maintain grade stakes until removal is mutually agreed upon by parties concerned.

6. Excavation: When conditions detrimental to plant growth are encountered, such as rubble fill, adverse drainage conditions, or obstructions, notify Architect before planting.

B. Maintenance Service:

1. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established (as defined in 5.3 A. of this specification section), but for not less than the following periods:

a. Seeded Turf: 60 days from date of planting completion.

b. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

2. Continuing Maintenance Proposal: From Installer to Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date acceptable seed has been established. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.7 GUARANTEE

- A. The contractor shall guarantee the germination of seed installed during the regular seeding season.
- B. Contractor shall also guarantee the establishment of sod during the regular seeding season.
- C. If construction operations result in an unstabilized site after the expiration of the Fall Planting Season, Contractor shall provide site and soil stabilization for winter conditions and shall proceed with seeding and sodding the following Spring Planting Period.

PART 2 PRODUCTS

2.1 TURF SEED

- A. Lawn Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
 - 1. State-certified seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
 - a. Kentucky bluegrass (*Poa pratensis*), a minimum of three cultivars.

2.3 FERTILIZERS

- A. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - 1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - 2. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

2.4 MULCHES

- A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
- B. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors. Use only for site stabilization if seeding and sodding can not occur before end of Fall Planting Period and site must be stabilized over winter.
- C. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors. Use only for site stabilization if seeding and sodding can not occur before end of Fall Planting Period and site must be stabilized over winter.

2.5 PESTICIDES

- A. General: Pesticide, registered and approved by EPA, acceptable to authorities having

jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide: Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide: Effective for controlling weed growth that has already germinated.

2.6 EROSION-CONTROL MATERIALS

A. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, 6 inches long.

B. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

C. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of 3-inch nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Invisible Structures, Inc.; Slopetame 2.
- b. Presto Products Company, a business of Alcoa; Geoweb.
- c. Tenax Corporation - USA; Tenweb.
- d. Or equal

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.

3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.

4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

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

2 C. If contamination by foreign or deleterious material or liquid is present in soil within a
3 planting area, remove the soil and contamination as directed by Architect and replace with
4 new planting soil.

5 3.2 PREPARATION

6 A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and
7 plantings from damage caused by planting operations.

8 1. Protect adjacent and adjoining areas from hydroseeding and hydromulching
9 overspray.

10 2. Protect grade stakes set by others until directed to remove them.

11 B. Install erosion-control measures to prevent erosion or displacement of soils and discharge
12 of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

13 3.3 TURF AREA PREPARATION

14 A. Limit turf subgrade preparation to areas to be planted.

15 B. Confirm topsoil has been provided per Specification Section 32 91 13 "Soil Preparation"
16 in the areas and depths indicated by the written specifications. If unsuitable topsoil
17 conditions or depths exist, notify General Contractor immediately and do not proceed with
18 seeding operations until unsatisfactory conditions have been corrected.

19 C. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose,
20 uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and
21 rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas
22 that can be planted in the immediate future.

23 D. Loosen any compaction that may have occurred after topsoil placement to ensure loosened
24 soil to a minimum depth of 8 inches.

25 E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to
26 dry before planting. Do not create muddy soil.

27 F. Before planting, obtain Owner's Representative's acceptance of finish grading; restore
28 planting areas if eroded or otherwise disturbed after finish grading.

29 G. No seeding shall occur on frozen ground or at temperatures lower than 32 deg. F.

30 3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

31 A. For erosion-control blanket or mesh, install from top of slope, working downward, and as
32 recommended by material manufacturer for site conditions. Fasten as recommended by
33 material manufacturer.

34 B. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface
35 to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. TURF SEEDING

1. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - a. Do not use wet seed or seed that is moldy or otherwise damaged.
 - b. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
2. Sow seed at a total rate as indicated by seed supplier.
3. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.
4. Retain one or all options in first paragraph below if specifying blankets or mesh. Coordinate erosion-control materials with slope ratios and revise if required.
5. Protect seeded areas with slopes exceeding 1:4 or any areas where planting soil continues to migrate due to wind or water activities with erosion-control blankets installed and stapled according to manufacturer's written instructions.
6. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.
 - a. Anchor straw mulch by crimping into soil with suitable mechanical equipment.

3.7 TURF MAINTENANCE

- A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 2. Retain first subparagraph below if mulching is required.
 3. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 4. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
- B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

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1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.

2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Bluegrass Turf to a minimum height of 2-1/2 inches

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area and conform all fertilizer types and application to local ordinances.

3.9 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Owner's Representative:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.10 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.11 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance

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- 1 period and remove after plantings are established.
- 2 C. Remove nondegradable erosion-control measures after grass establishment period.
- 3 END OF SECTION

SECTION 33 31 00

SANITARY UTILITY SEWERAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sanitary sewage pipe.
2. Underground pipe markers.
3. Manholes
4. Bedding and cover materials.

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Concrete type for manhole base pad construction.
2. Section 22 13 00 - Facility Sanitary Sewerage: Product and execution requirements for sanitary waste and vent piping at building.
3. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this section.
4. Section 31 23 17 - Trenching: Execution requirements for trenching required by this section.
5. Section 31 23 23 - Fill: Requirements for backfill to be placed by this section.

1.2 PERMITS & NOTIFICATIONS

- A. Obtain all local, state, and federal permits and pay all plan review and permit fees and deposits required for the Work specified herein.
- B. Perform all Work in accordance with the aforementioned permits.

1.3 REFERENCES

A. ASTM International:

1. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
2. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
3. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride)

(PVC) Sewer Pipe and Fittings.

4. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for Manhole Lid and Frame, Precast Manhole Sections, Steps, Boots, Adjust Rings and Frame/Chimney Seal.
- C. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.5 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.

1. Materials Resources Certificates:

- a. Certify source and origin for salvaged and reused products.
- b. Certify recycled material content for recycled content products.
- c. Certify source for local and regional materials and distance from Project site.

- C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.

1. Provide cost data for the following products:

- a. Salvaged products.
- b. Reused products.
- c. Products with recycled material content.
- d. Local and regional products.

1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

1.7 QUALITY ASSURANCE

- A. Sustainable Design Requirements:
 1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

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- B. Perform Work in accordance with Municipality of Columbus, Ohio public works and the City of Columbus Construction and Materials Specifications .

1.8 PRE-INSTALLATION MEETINGS

- A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.
- B. Convene minimum one week prior to commencing work of this section.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements and elevations are as indicated.

1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Obtain City of Columbus permits and pay all fees for sanitary sewer installation and connection to public sanitary sewer main in Morse Road.
- C. Perform all work related to the installation of the sanitary sewer in conformance with the City of Columbus permit requirements for the work.
- D. Coordinate the Work with termination of sanitary sewer connection outside building and trenching.

PART 2 PRODUCTS

2.1 SANITARY SEWAGE PIPE

- A. Plastic Pipe: ASTM D3034, SDR 35, Poly Vinyl Chloride (PVC) material; inside nominal diameter as specified on the drawings, bell and spigot style rubber ring sealed gasket joint.
 - 1. Fittings: ASTM D3034
 - 2. Joints: ASTM F477, elastomeric gaskets.

2.2 UNDERGROUND PIPE MARKERS

- A. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Sewer Service" in large letters.

2.3 MANHOLES

- A. Manhole Lid and Frame:
 - 1. Construction: ASTM-A-48, Class 35B Gray Iron heavy duty (exceeds proof loads of 16,000 lbs.) construction.
 - 2. Lid Design: diamond pattern, concealed pick hole, gasketed lid.
 - 3. Nominal Lid Size: 23" diameter, minimum of 1" thick

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4. Nominal Frame Size: 24" outside diameter at surface with 21" clear opening, 9" depth, 36" outside diameter at bottom.

B. Precast Concrete Manhole Sections, including bottom and top:

1. Shall meet the requirements of ASTM C478.
2. Unless otherwise noted, four foot diameter manholes are required.
3. For 4' diameter manholes, provide eccentric cone top sections with a minimum clear opening of 24 inches. Flat top slabs may be used on manholes greater than 4' in diameter.
4. Manhole wall thickness shall be minimum of 5" for 4' diameter manholes, 6" for 5' diameter manholes and 7" for 6' and 7' diameter manholes.
5. Manhole bottom section shall be pre-cast with integral base having a minimum thickness of 8" unless otherwise noted.

C. Manhole Joints

1. Provide manhole riser and barrel sections, cones, and flat tops, with standard pipe section tongue and groove joints.
2. Seal joints watertight with prefabricated rubber or plastic gaskets or formed in place butyl rubber seal.

D. Pipe Connections

1. Openings for connections shall be cast-in-place or cored and appropriately sized for the type and size of pipe being connected.
2. Provide flexible, watertight, pipe-to-manhole connections (or "boots").

E. Manhole Steps

1. Provide steps at 16" O.C. and project approximately 6" from wall.
2. Unless otherwise indicated on the drawings, locate manhole steps over the downstream pipe opening.
3. Manhole steps shall be steel reinforced polypropylene with 1/2-inch diameter deformed reinforcing bar. Steps shall be permanently secured in the manhole wall.

F. Bench and Flowline

1. Provide either pre-cast or cast-in-place bench and flowline.
2. Unless otherwise indicated on the drawings, bench height shall be 3/4 the diameter of the downstream pipe. Slope bench towards flowlines at a minimum 1/2" per foot. Provide light broom finish on bench.

3. Flowlines shall be formed with gradual, uniform sweeps directed towards the downstream pipe. Provide smooth, troweled finish for flowlines.

4. When cast-in-place benches and flowline are used, lay the sewer pipe through the manhole.

G. Adjusting Rings

1. Pre-cast concrete adjusting rings meeting the requirements of ASTM C-478. Provide rings of 2" or 4" thickness.

2. Precompressed butyl gasket, 3/8"x3 1/2" shall be used between the top of the manhole and first adjustment ring, and between all subsequent rings.

H. Frame/Chimney Seal

1. The manhole frame seal shall be designed to prevent leakage of water through the manhole frame throughout a 50-year design life. It shall also be capable of allowing repeated vertical movement of not less than 2 inches and/or repeated horizontal movement of not less than 1/2 inch after installation and throughout its design life.

2. Frame seals shall consist of a flexible internal rubber sleeve, extensions and stainless steel expansion bands, all conforming to the following requirements:

a. Rubber Sleeve and Extension:

1) The flexible rubber sleeve and extensions shall be extruded or molded from a high grade rubber compound conforming to the applicable material requirements of ASTM C-923, with a minimum 1500 psi tensile strength, maximum 18% compression set and a hardness (durometer) of 48±5.

2) The rubber sleeve shall be double, triple or quadruple pleated with a minimum unexpanded vertical height of 8 inches, 10 inches or 13 inches respectively and a minimum thickness of 3/16 inches. The top and bottom section of the sleeve that compresses against the manhole frame casting and the chimney/cone shall have an integrally formed expansion band recess and a series of sealing fins to facilitate a watertight seal.

3) Any splice used to fabricate the sleeve and extension shall be hot vulcanized and have a strength such that the sleeve shall withstand a 180 degree bend with no visible separation.

b. Expansion Bands

1) The expansion bands used to compress the sleeve against the manhole shall be integrally formed from 16 gauge stainless steel conforming to the applicable material requirements of ASTM C-923, Type 304, with no welded attachments and shall have a minimum width of 1-3/4 inches.

2) The bands shall have a minimum adjustment range of 2-1/2 diameter inches and a positive locking mechanism which secures the band in its expanded position after tightening.

2.4 BEDDING AND COVER MATERIALS

- A. Bedding: Fill Type as specified in Section 31 23 17.
- B. Cover: Fill Type as specified in Section 31 23 17.
- C. Soil Backfill from Above Pipe to Finish Grade: Soil Type, as specified in Section 31 23 17.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut and excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

- A. Correct over excavation as specified in Section 31 23 17.
- B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.3 BEDDING

- A. Excavate pipe trench in accordance with Section 31 23 17.
- B. Place bedding material at trench bottom, level materials in continuous layer.
- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with Section 900 of the City of Columbus Construction and Material Specifications. Seal joints watertight.
- B. Lay pipe to slope gradients noted on drawings; with maximum variation from indicated slope of 1/8 inch in 10 feet.
- C. Install bedding at sides and over top of pipe to minimum compacted thickness of 12 inches.
- D. Refer to Section 31 23 17 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.
- E. Connect to sanitary sewer outlet to the public main sanitary sewer in accordance with the City of Columbus permit requirements
- F. Install trace wire continuous buried 18 inches below finish grade.

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1 G. Install site sanitary sewage system piping to 5 feet of building. Connect to building sanitary
2 waste system. Refer to Section 22 13 00.

3 H. Provide exterior cleanouts where shown on the drawing.

4 3.5 INSTALLATION - MANHOLES

5 A. Excavate for manholes in accordance with Section 31 23 17.

6 B. Form bottom of excavation clean and smooth to correct elevation.

7 C. Form and place cast-in-place concrete base pad or install precast bottom, with provision
8 for sanitary sewer pipe end sections.

9 D. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.

10 3.6 FIELD QUALITY CONTROL

11 A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and
12 balancing.

13 B. Perform test on site sanitary sewage system in accordance with Municipality of Columbus,
14 Ohio public works.

15 C. When tests indicate Work does not meet specified requirements, remove work, replace and
16 retest.

17 3.7 PROTECTION OF FINISHED WORK

18 A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting
19 finished Work.

20 B. Protect pipe and aggregate cover from damage or displacement until backfilling operation
21 is in progress.

22 END OF SECTION

SECTION 33 41 00

STORM UTILITY DRAINAGE PIPING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes:

1. Storm drainage piping
2. Underground pipe markers
3. Catch basins
4. Bedding and cover materials

B. Related Sections:

1. Section 03 30 00 - Cast-In-Place Concrete: Concrete type for catch basin base pad construction.
2. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar and grout.
3. Section 22 14 00 - Facility Storm Drainage: Product and execution requirements for storm drainage piping within 5 feet of building.
4. Section 31 23 16 - Excavation: Product and execution requirements for excavation and backfill required by this section.
5. Section 31 23 17 - Trenching: Execution requirements for trenching required by this section.
6. Section 31 23 23 - Fill: Requirements for backfill to be placed by this section.

1.2 REFERENCES

A. ASTM International:

1. ASTM C76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.
2. ASTM C443 - Standard Specification for Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.
3. ASTM D1557 - Standard Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
4. ASTM D6938 - Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

5. ASTM D3034 - Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
6. ASTM D3212 – Standard Specification for Joints for Drain and Sewer Plastic Pipes using Flexible Elastomeric Seals.
7. ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
8. ASTM F949 Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified requirements.
- C. Castings cut sheets.
- D. Trash rack cut sheets

1.4 SUSTAINABLE DESIGN SUBMITTALS

- A. Section 01 81 13 - Sustainable Design Requirements: Requirements for sustainable design submittals.
- B. Manufacturer's Certificate: Certify products meet or exceed specified sustainable design requirements.
 1. Materials Resources Certificates:
 - a. Certify source and origin for salvaged and reused products.
 - b. Certify recycled material content for recycled content products.
 - c. Certify source for local and regional materials and distance from Project site.
 - C. Product Cost Data: Submit cost of products to verify compliance with Project sustainable design requirements. Exclude cost of labor and equipment to install products.
 1. Provide cost data for the following products:
 - a. Salvaged products.
 - b. Reused products.
 - c. Products with recycled material content.
 - d. Local and regional products.

1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents:

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1. Accurately record actual locations of pipe runs, connections, catch basins, and invert elevations.

2. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. Sustainable Design Requirements:

1. Regional Materials: Furnish materials extracted, processed, and manufactured within 500 miles of Project site.

B. Perform Work in accordance with Municipality of Columbus, Ohio public works.

1.7 PRE-INSTALLATION MEETINGS

A. Section 01 30 00 - Administrative Requirements: Pre-installation meeting.

B. Convene minimum one week prior to commencing work of this section.

1.8 COORDINATION

A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

B. Coordinate the Work with termination of storm sewer connection outside building, trenching, connection to foundation drainage system.

PART 2 PRODUCTS

2.1 STORM DRAINAGE PIPING

A. Reinforced Concrete Pipe: ASTM C76, Wall Type C, Class IV, inside diameter specified on the drawings, profile/o-ring joint.

1. Fittings: Reinforced concrete.

2. Joints: ASTM C443, rubber compression gasket.

B. Plastic Pipe: ASTM D3034, Type PSM, Poly (Vinyl Chloride) (PVC) material; SDR 35; inside diameter specified on the drawings, bell and spigot style rubber ring sealed gasket joint.

1. Fittings: PVC.

2. Joints: ASTM F477, elastomeric gaskets.

C. Plastic Pipe: ASTM F949, Perforated Corrugated Pipe with Smooth Interior, Poly (Vinyl Chloride) (PVC) material; inside diameter specified on the drawings, bell and spigot style rubber ring sealed gasket joint.

1. Fittings: PVC.

2. Joints: ASTM D3212, elastomeric gaskets.

D. Ductile Iron Pipe: AWWA C151

1. All pipe shall be Class 53.

2. Fittings: Ductile Iron, standard thickness

3. Joints: AWWA C111, rubber gasket with rods.

2.2 BUTTERFLY VALVES

A. Furnish materials in accordance with City of Columbus Construction and Material Specifications Section 802.03.

1. Shall be Pratt Model groundhog type or approved equal .

B. Butterfly Valves: AWWA C504, Class 150B designed for 150 psi non-shock shut-off pressure and a velocity of 16 feet per second.

1. Body: Cast Iron ASTM A126, Class B or ASTM A48, Class 40 or ductile iron ASTM A536, Grade 65-45-12.

2. Shafts: High Strength Steel, Stainless Steel, Monel – AWWA C504, Class 150B

3. Disks: Shall have a 316 Type 18-8 Stainless steel edge.

4. Seats: Shall be retained in a dove tail groove by an epoxy cast retaining ring or mechanical fasteners or other approved method.

5. Operator: Shall be suitable for buried and submerged service and installed by the valve manufacturer, and tested in accordance with AWWA C504.

2.3 UNDERGROUND PIPE MARKERS

A. Trace Wire: Magnetic detectable conductor, brightly colored plastic covering, imprinted with "Storm Sewer Service" in large letters.

2.4 CATCH BASINS

A. Catch Basin Lid and Frame:

1. Construction: ASTM-A-48, Class 35B Gray Iron heavy duty (exceeds proof loads of 16,000 lbs.) construction.

2. Lid Design: Flat, open-grate, ADA compliant.

3. Nominal Lid Size: 23" diameter, minimum of 1" thick

4. Nominal Frame Size: 24" outside diameter at surface with 21" clear opening, 9" depth, 36" outside diameter at bottom.

B. Precast Catch Basin Sections:

1. Round catch basins shall be 48" inside diameter precast concrete unless otherwise shown on the drawings or required.
2. Contractor shall carefully locate all pipe locations, sizes, orientation and elevation prior to ordering catch basin.
3. Round catch basins shall meet the requirements of ASTM C478.
4. Pre-cast catch basin wall thickness shall be minimum of 5".
5. Provide 6" thick pre-cast catch basin base. Catch basin bottom section may be pre-cast with integral base.

C. Steps:

1. Provide steps at 16 inches (400 mm) on center $\pm$ and project approximately 6" from wall.
2. Unless otherwise indicated on the drawings, locate steps over the downstream pipe opening.
3. Steps shall be steel reinforced polypropylene with 1/2-inch diameter deformed reinforcing bar. Steps shall be permanently secured in the manhole wall.

D. Joints:

1. Catch basins requiring separate base and riser sections, must be provided with standard pipe tongue and groove joints.
2. Seal joints watertight with prefabricated rubber or plastic gaskets or formed in place butyl rubber seal.

E. Connections:

1. Provide custom knock-outs/cut-outs based on project and location specific conditions.
2. A minimum of 2" of the precast structure is required between the top of a knock-out/cut-out and the top of the structure. A minimum of 2" of precast structure is required between the side of a knock-out/cut-out and the inside face of an adjacent sidewall.

F. Adjusting Rings:

1. Pre-cast concrete adjusting rings meeting the requirements of ASTM C-478. Provide rings of 2" or 4" thickness.
2. Precompressed butyl gasket, 3/8"x3 1/2" shall be used between the top of the catch basin and first adjustment ring, and between all subsequent rings.

2.5 MANHOLES

A. Manhole Lid and Frame:

1. Construction: ASTM-A-48, Class 35B Gray Iron heavy duty (exceeds proof loads of 16,000 lbs.) construction.
2. Lid Design: diamond pattern, concealed pick hole, gasketed lid.
3. Nominal Lid Size: 23" diameter, minimum of 1" thick.
4. Nominal Frame Size: 24" outside diameter at surface with 21" clear opening, 9" depth, 36" outside diameter at bottom.

B. Precast Manhole Sections:

1. Provide manholes of the 48" diameter unless otherwise indicated on the drawings.
2. Contractor shall carefully locate all pipe locations, sizes, orientation and elevation prior to ordering new manholes.
3. Precast concrete manhole sections, including bottom and top shall meet the requirements of ASTM C478.
4. Manhole wall thickness shall be minimum of 5" for 4' diameter manholes, 6" for 5' diameter manholes and 7" for 6' and 7' diameter manholes.
5. Provide pre-cast manhole base. Manhole bottom section may be pre-cast with integral base.

C. Joints:

1. Provide manhole riser and barrel sections, cones, and flat tops, with standard pipe section tongue and groove joints.
2. Seal joints watertight with prefabricated rubber or plastic gaskets or formed in place butyl rubber seal.

D. Connections:

1. Openings for connections in pre-cast structures shall be knock-outs or cut-outs.
2. Cut-outs shall not extend into the joint of the bottom manhole section.
3. Provide a minimum of 12" of separation between the edge of adjacent cut-outs or knock-outs.

E. Manhole Steps:

1. Provide steps at 16 inches on center $\pm$ and project approximately 6" from wall.
2. Unless otherwise indicated on the drawings, locate manhole steps over the

downstream pipe opening.

3. Manhole steps shall be steel reinforced polypropylene with ½-inch diameter deformed reinforcing bar. Steps shall be permanently secured in the manhole wall.

F. Bench and Flowline

1. Provide either pre-cast or cast-in-place bench and flowline.
2. Unless otherwise indicated on the drawings, bench height shall be 1/2 the diameter of the downstream pipe. Slope bench towards flowlines at a minimum ½" per foot. Provide light broom finish on bench.
3. Flowlines shall be formed with gradual, uniform sweeps directed towards the downstream pipe. Provide smooth, troweled finish for flowlines.

G. Adjusting Rings

1. Pre-cast concrete adjusting rings meeting the requirements of ASTM C-478. Provide rings of 2" or 4" thickness.
2. Precompressed butyl gasket, 3/8"x3 ½" shall be used between the top of the manhole and first adjustment ring, and between all subsequent rings.

2.6 INLETS

A. Inlet Lid and Frame:

1. Construction: ASTM-A-48, Class 35B Gray Iron heavy duty (exceeds proof loads of 16,000 lbs.) construction, asphalt emulsion dipped for black finish.
2. Lid Design: flat, open grate, ADA compliant.
3. Nominal Lid Size: 13" X 25" (+/- 1"), 1" thick minimum.
4. Nominal Frame Size: 16" X 28" (+/- 1"), 1.5" thick minimum depth, clear opening of 12" X 24" (+/- 1")

B. Precast Inlet Sections:

1. Precast inlets, shall meet the requirements of ASTM C478.
2. Provide rectangular inlets meeting the size requirements of The City of Columbus Construction and Material Specifications
3. Pre-cast inlet wall thickness shall be minimum of 4".
4. Provide integral pre-cast inlet base.

C. Joints:

1. Inlets requiring separate riser sections, must be provided with standard pipe tongue

and groove joints.

2. Seal joints watertight with prefabricated rubber or plastic gaskets or formed in place butyl rubber seal.

D. Connections:

1. Provide custom knock-outs/cut-outs based on project and location specific conditions.
2. A minimum of 2" of the precast structure is required between the top of a knock-out/cut-out and the top of the structure.
3. A minimum of 2" of precast structure is required between the side of a knock-out/cut-out and the inside face of an adjacent sidewall.

E. Flowline:

1. Provide either pre-cast or cast-in-place flowline that provides positive flow through the structure. Provide bench that directs water towards the flowline.
2. Flowlines and benches shall be formed with gradual, uniform sweeps directed towards the downstream pipe. Provide smooth, troweled finish for flowlines.

2.7 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 31 23 17, unless otherwise noted on the drawings.
- B. Cover: As specified in Section 31 23 17, unless otherwise noted on the drawings.
- C. Soil Backfill from Above Pipe to Finish Grade: As specified in Section 31 23 17, unless otherwise noted on the drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench cut and excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

- A. Obtain City of Columbus permits for storm sewer installation and connection to existing on-site storm sewerage that is tributary to the public storm sewer main in Morse Road.
- B. Comply with City of Columbus permit requirements related to the storm sewer installation work.
- C. Hand trim excavations to required elevations. Correct over excavation with undercut

backfill as per Section 31 23 17.

- D. Remove large stones or other hard matter which could damage piping or impede consistent backfilling or compaction.

3.3 BEDDING

- A. Excavate pipe trench in accordance with Section 31 23 17 for work of this Section. Hand trim excavation for accurate placement of pipe to elevations indicated.

- B. Place bedding material at trench bottom, level materials in a continuous layer.

- C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION – PIPE

- A. Install pipe, fittings, and accessories in accordance with ASTM D2321 and The City of Columbus Construction and Material Specifications.

- B. Lay pipe to slope gradients noted on drawings with maximum variation from indicated slope of 1/8 in 10 feet.

- C. Install aggregate at sides and over top of pipe. Install top cover to minimum compacted thickness of 12.

- D. Refer to Section 31 23 17 for backfilling and compacting requirements. Do not displace or damage pipe when compacting.

- E. Install trace wire continuous buried 18 inches below finish grade, above pipe line.

- F. Install site storm drainage system piping to 5 feet of building. Connect to building storm drainage system.

3.5 INSTALLATION - CATCH BASINS, MANHOLES AND INLETS

- A. Form bottom of excavation clean and smooth to correct elevation.

- B. Level top surface of base pad; sleeve concrete sections to receive storm sewer pipe sections.

- C. Establish elevations and pipe inverts for inlets and outlets as indicated on Drawings.

- D. Mount lid and frame level in grout, secured to flat top slab section to elevation indicated.

3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

- B. Perform test on site sanitary sewage system in accordance with Municipality of Columbus, Ohio public works.

- C. When tests indicate work does not meet specified requirements, remove work, replace and retest.

3.7 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished Work.

- B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

1. Take care not to damage or displace installed pipe and joints during construction of pipe supports, backfilling, testing, and other operations.

2. Repair or replace pipe that is damaged or displaced from construction operations.

END OF SECTION

SECTION 33 71 73

ELECTRICAL UTILITY SERVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Arrangement with Utility Company for permanent electric service. Utility Company charges for service shall be paid by the Owner.
- B. Underground service entrance.
- C. Metering equipment.

1.2 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.
- B. American Electric Power, Guide for Electric Service and Meter Installations, April 28, 2009.

1.3 SUBMITTALS

- A. Submit shop drawings of service entrance equipment for approval by Electrical Utility before submitting approved drawings to ENGINEER.

1.4 SYSTEM DESCRIPTION

- A. Utility Company: American Electric Power
- B. Electric service characteristics for this project shall be as indicated on drawings, and are based on Figure 11 (page 32) of the AEP Meter & Service Guide.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with Utility Company written requirements.
- B. Maintain one copy of each document on site.

1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Conform to requirements of American Electric Power, Guide for Electric Service and Meter Installations, April 28, 2009.
- C. Furnish products listed and classified by Underwriters Laboratories, Inc. and/or the testing firm acceptable to authority having jurisdiction as suitable for purpose specified and shown.

1.7 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on Utility Company drawings.

PART 2 PRODUCTS

2.1 UTILITY METERS

- A. Meters will be furnished and installed by Utility Company.

2.2 UTILITY METER SOCKET

- A. Meter socket will be furnished by Utility Company and installed by the EC.

2.3 METERING CT CABINET

- A. Manufacturers:

1. Austin 363612WL.
2. Cooper-BLine 363612WBDDRTCT.
3. Hoffman Engineering A363611HCT.
4. Wiegmann Company WCT363612.
5. Meter Devices Company 507U6546.
6. Milbank Manufacturing 363612-LC3R-SP-WB.
7. Unity Manufacturing Company AEP363612SDCT3

- B. All CT cabinets shall be NEMA 3R and approved by the Utility Company.

- C. Description: Ratings as indicated on the drawings.

- D. Include provisions for padlocking and sealing.

- E. Window type CTs shall be provided by the Utility.

PART 3 EXECUTION

3.1 PRE-INSTALLATION CONFERENCE

- A. The contractor shall meet with the electric utility prior to rough-in to review and coordinate the installation of the electrical service and verify existing conditions and any special requirements.

3.2 PREPARATION

- A. Make arrangements with Utility Company to obtain permanent electric service to the Project.

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1 B. Consult with Electric Utility to verify service information specified herein and shown on
2 drawings before submitting bid.

3 C. Coordinate location of Utility Company's facilities to ensure proper access is available.

4 3.3 EXAMINATION

5 A. Verify that service equipment is ready to be connected and energized.

6 3.4 INSTALLATION

7 A. Install service entrance conduits in concrete envelope from building service entrance
8 equipment per Utility Company requirements.

9 B. Utility Company will install the secondary wiring between the CT cabinet and the meter
10 socket.

11 C. EC Shall provide conductors from service entrance equipment to CT cabinet, and bolt to
12 lugging in CT Cabinet.

13 D. Utility shall provide secondary conductors from Utility transformer lugging within CT
14 cabinet.

15 END OF SECTION

Exhibit F

008. MRTS Improvements Project Construction Plans

Available as separate download from SWACO's website.

Exhibit G

009. Prevailing Wages

The following Prevailing Wage Rate pages are from the Ohio Department of Commerce. Please note that it is the responsibility of the Successful Bidder to comply with prevailing wages as directed by the Ohio Department of Commerce.

Prevailing Wage Rate Skilled Crafts

Name of Union: Asbestos Local 50 Heat & Frost Insulators

Change # : LCN02-2024ibAsbLoc50

Craft : Asbestos Worker **Effective Date :** 07/10/2024 **Last Posted :** 07/10/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Asbestos Insulation Mechanic	\$39.06		\$9.20	\$8.35	\$0.50	\$0.00	\$3.75	\$0.10	\$0.00	\$0.00	\$60.96	\$80.49
Firestop Technician	\$39.06		\$9.20	\$8.35	\$0.50	\$0.00	\$3.75	\$0.10	\$0.00	\$0.00	\$60.96	\$80.49
Apprentice	Percent											
1st year	60.00	\$23.44	\$9.20	\$4.52	\$0.50	\$0.00	\$0.50	\$0.10	\$0.00	\$0.00	\$38.26	\$49.97
2nd year	70.00	\$27.34	\$9.20	\$4.52	\$0.50	\$0.00	\$0.85	\$0.10	\$0.00	\$0.00	\$42.51	\$56.18
3rd year	80.00	\$31.25	\$9.20	\$6.76	\$0.50	\$0.00	\$1.25	\$0.10	\$0.00	\$0.00	\$49.06	\$64.68
4th year	85.00	\$33.20	\$9.20	\$6.76	\$0.50	\$0.00	\$1.50	\$0.10	\$0.00	\$0.00	\$51.26	\$67.86

Special Calculation Note : *other is Labor Mgt Training Fund

Ratio :

1 Journeymen to 1 Apprentice
4 Journeymen to 1 Apprentice thereafter

Jurisdiction (* denotes special jurisdictional note) :

ATHENS, AUGLAIZE, BUTLER*, CHAMPAIGN, CLARK, CLINTON, CRAWFORD, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GREENE, GUERNSEY, HARDIN, HOCKING, KNOX, LICKING, LOGAN, MADISON, MARION, MIAMI, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PREBLE, ROSS, SHELBY, UNION, VINTON, WARREN*

Special Jurisdictional Note : Township of Butler County: Townships of Lemon and Madison.

Warren County: Township of Cleer Creek, Franklin, Massie, Turtle Creek and Wayne

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Asbestos Local 50 Zone 1

Change # : LCN01-2024ibAsbLoc50Zone1

Craft : Asbestos Worker Effective Date : 03/06/2024 Last Posted : 03/06/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Asbestos Insulation Mechanic	\$35.61		\$9.20	\$8.35	\$0.50	\$0.00	\$3.75	\$0.10	\$0.00	\$0.00	\$57.51	\$75.31
Firestop Technician	\$35.61		\$9.20	\$8.35	\$0.50	\$0.00	\$3.75	\$0.10	\$0.00	\$0.00	\$57.51	\$75.31
Apprentice	Percent											
1st year	54.14	\$19.28	\$8.96	\$0.00	\$0.44	\$0.00	\$0.50	\$0.10	\$0.00	\$0.00	\$29.28	\$38.92
2nd year	65.85	\$23.45	\$9.20	\$0.95	\$0.44	\$0.00	\$0.85	\$0.10	\$0.00	\$0.00	\$34.99	\$46.71
3rd year	76.72	\$27.32	\$9.20	\$2.38	\$0.44	\$0.00	\$1.25	\$0.10	\$0.00	\$0.00	\$40.69	\$54.35
4th year	84.04	\$29.93	\$9.20	\$2.38	\$0.44	\$0.00	\$1.50	\$0.10	\$0.00	\$0.00	\$43.55	\$58.51

Special Calculation Note : *other is Labor Mgt Training Fund

Ratio :

1 Journeymen to 1 Apprentice
4 Journeymen to 1 Apprentice thereafter

Jurisdiction (* denotes special jurisdictional note) :

ATHENS, AUGLAIZE, BUTLER*, CLINTON, CRAWFORD, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GUERNSEY, HARDIN, HOCKING, KNOX, LICKING, LOGAN, MADISON, MARION, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, ROSS, SHELBY, UNION, VINTON, WARREN*

Special Jurisdictional Note : Township of Butler County-Townships of Lemon and Madison. Warren County-Township of Cleer Creek, Franklin, Massie, Turtle Creek and Wayne

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Asbestos Local 207

Change # : LCR01-2024ibLoc207

Craft : Asbestos Worker Effective Date : 07/24/2024 Last Posted : 07/24/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Asbestos Abatement	\$30.00		\$10.45	\$7.00	\$0.65	\$3.25	\$0.00	\$0.00	\$0.00	\$0.00	\$51.35	\$66.35
Trainee	Percent											
Trainee	65.15	\$19.55	\$10.45	\$1.60	\$0.65	\$1.00	\$0.00	\$0.00	\$0.00	\$0.00	\$33.25	\$43.02

Special Calculation Note :

Ratio :

3 Journeymen to 1 Trainee

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ASHLAND, ASHTABULA*, ATHENS, AUGLAIZE, BROWN, BUTLER*, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DELAWARE, ERIE*, FAIRFIELD, FAYETTE, FRANKLIN, GEAUGA, GREENE, GUERNSEY, HAMILTON, HARDIN, HARRISON, HIGHLAND, HOCKING, HOLMES, HURON, KNOX, LAKE, LICKING, LOGAN, LORAIN, MADISON, MAHONING, MARION, MEDINA, MIAMI, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PORTAGE, PREBLE, RICHLAND, ROSS, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VINTON, WARREN*, WAYNE

Special Jurisdictional Note : Ashtabula County: (post offices & townships of Ashtabula, Austinburg, Geneva, Harperfield, Jefferson, Plymouth & Saybrook) (townships of Andover, Cherry Valley, Colbrook, Canneaut, Denmark, Dorset, East Orwell, Hartsgrove, Kingville, Lenox, Monroe, Morgan, New Lyme, North Kingsville, Orwell, Pierpoint, Richmond Rock Creek, Rome, Sheffield, Trumbull, Wayne,

Williamsfield & Windsor)

Butler County: (townships of Fairfield, Hanover, Liberty, Milford, Morgan, Oxford, Ripley, Ross, St. Clair, Union & Wayne) (Lemon & Madison)

Erie County: (post offices & townships of Berlin, Berlin Heights, Birmingham, Florence, Huron, Milan, Shinrock & Vermilion)

Warren County: (townships of: Deerfield, Hamilton, Harlan, Salem, Union & Washington) (Clear Creek, Franklin, Mossie, Turtle Creek & Wayne)

Details :

Asbestos & lead paint abatement including, but not limited to the removal or encapsulation of asbestos & lead paint, all work in conjunction with the preparation of the removal of same & all work in conjunction with the clean up after said removal. The removal of all insulation materials, whether they contain asbestos or not, from mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) is recognized as being the exclusive work of the Asbestos Abatement Workers.

On all mechanical systems (pipes, boilers, ducts, flues, breaching, etc.) that are going to be demolished, the removal of all insulating materials whether they contain asbestos or not shall be the exclusive work of the Laborers.

An Abatement Journeyman is anyone who has more than 600 hours in the Asbestos Abatement field.

Prevailing Wage Rate

Skilled Crafts

Name of Union: **Boilermaker Local 105**

Change # : **LCN02-2013fbLoc 105**

Craft : **Boilermaker** Effective Date : **10/01/2013** Last Posted : **09/25/2013**

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Boilermaker	\$35.26		\$7.07	\$13.28	\$0.89	\$0.00	\$3.00	\$0.55	\$0.00	\$0.00	\$60.05	\$77.68
Apprentice	Percent											
1st 6 months	70.03	\$24.69	\$7.07	\$11.30	\$0.89	\$0.00	\$2.10	\$0.55	\$0.00	\$0.00	\$46.60	\$58.95
2nd 6 months	75.02	\$26.45	\$7.07	\$11.30	\$0.89	\$0.00	\$2.25	\$0.55	\$0.00	\$0.00	\$48.51	\$61.74
3rd 6 months	80.00	\$28.21	\$7.07	\$11.30	\$0.89	\$0.00	\$2.40	\$0.55	\$0.00	\$0.00	\$50.42	\$64.52
4th 6 months	85.02	\$29.98	\$7.07	\$11.30	\$0.89	\$0.00	\$2.55	\$0.55	\$0.00	\$0.00	\$52.34	\$67.33
5th 6 months	87.52	\$30.86	\$7.07	\$13.28	\$0.89	\$0.00	\$2.63	\$0.55	\$0.00	\$0.00	\$55.28	\$70.71
6th 6 months	90.03	\$31.74	\$7.07	\$13.28	\$0.89	\$0.00	\$2.70	\$0.55	\$0.00	\$0.00	\$56.23	\$72.11
7th 6 months	92.50	\$32.62	\$7.07	\$13.28	\$0.89	\$0.00	\$2.78	\$0.55	\$0.00	\$0.00	\$57.19	\$73.49
8th 6 months	95.00	\$33.50	\$7.07	\$13.28	\$0.89	\$0.00	\$2.85	\$0.55	\$0.00	\$0.00	\$58.14	\$74.89

Special Calculation Note : Other is Supplemental Health and Welfare

Ratio :

5 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ATHENS, BROWN, BUTLER, CHAMPAIGN, CLARK, CLERMONT, CLINTON, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GREENE, GUERNSEY, HAMILTON, HIGHLAND, HOCKING, JACKSON, LAWRENCE, LICKING, MADISON, MEIGS, MIAMI, MONTGOMERY, MORGAN, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, PREBLE, ROSS, SCIOTO, VINTON, WARREN

Special Jurisdictional Note :

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Bricklayer Local 23 (Columbus Tile Finisher)

Change # : LCN01-2024ibLoc23CbusTileFin

Craft : Bricklayer Effective Date : 06/05/2024 Last Posted : 06/05/2024

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Bricklayer Tile Marble Finisher	\$30.28	\$7.72	\$3.24	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$41.76	\$56.90
Terrazzo Finisher	\$30.53	\$7.72	\$3.24	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.01	\$57.28
Floor Grinder	\$30.83	\$7.72	\$3.24	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.31	\$57.73
Base Grinder	\$31.03	\$7.72	\$3.24	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.51	\$58.03
Apprentice	Percent										
1st Year	70.00	\$21.20	\$7.72	\$3.24	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$32.68	\$43.27
2nd Year	80.00	\$24.22	\$7.72	\$3.24	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$35.70	\$47.82
3rd Year	90.00	\$27.25	\$7.72	\$3.24	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$38.73	\$52.36
Apprentice Improver	50.00	\$15.14	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$15.14	\$22.71

Special Calculation Note : Classification title contains "Bricklayer" because contract originates within the Bricklayer Local.

Note that the classification description is clarified after the local union number at the top of the page.

Ratio :

1-2 Journeymen to 1 Apprentice

3-5 Journeymen to 2 Apprentice

Crews larger than 5: 4 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ATHENS, COSHOCTON, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GUERNSEY, HOCKING, JACKSON, KNOX, LICKING, MADISON, MEIGS, MORGAN, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, ROSS, UNION, VINTON, WASHINGTON

Special Jurisdictional Note :

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Bricklayer Local 23 (Columbus Tile Setter)

Change # : LCN01-2024ibLoc23CbusTileSet

Craft : Bricklayer Effective Date : 06/05/2024 Last Posted : 06/05/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Bricklayer Tile Setter	\$31.97		\$8.67	\$7.40	\$0.65	\$0.00	\$1.00	\$0.00	\$0.00	\$0.00	\$49.69	\$65.68
Marble Mason	\$31.97		\$8.67	\$7.40	\$0.65	\$0.00	\$1.00	\$0.00	\$0.00	\$0.00	\$49.69	\$65.68
Terrazzo Worker	\$32.22		\$8.67	\$7.40	\$0.65	\$0.00	\$1.00	\$0.00	\$0.00	\$0.00	\$49.94	\$66.05
Terrazzo Worker, Installation	\$32.22		\$8.67	\$7.40	\$0.65	\$0.00	\$1.00	\$0.00	\$0.00	\$0.00	\$49.94	\$66.05
Apprentice	Percent											
1st Year	70.00	\$22.38	\$8.67	\$7.40	\$0.65	\$0.00	\$1.00	\$0.00	\$0.00	\$0.00	\$40.10	\$51.29
2nd Year	80.00	\$25.58	\$8.67	\$7.40	\$0.65	\$0.00	\$1.00	\$0.00	\$0.00	\$0.00	\$43.30	\$56.08
3rd Year	90.00	\$28.77	\$8.67	\$7.40	\$0.65	\$0.00	\$1.00	\$0.00	\$0.00	\$0.00	\$46.49	\$60.88
4th Year	95.00	\$30.37	\$8.67	\$7.40	\$0.65	\$0.00	\$1.00	\$0.00	\$0.00	\$0.00	\$48.09	\$63.28

Special Calculation Note : Classification title contains "Bricklayer" because contract originates within the Bricklayer Local.

Note that the classification description is clarified after the local union number at the top of the page.

Ratio :

1 - 3 Journeyman to 1 Apprentice
 4 - 8 Journeyman to 2 Apprentice
 9 - 13 Journeyman to 3 Apprentice
 14 - 18 Journeyman to 4 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ATHENS, COSHOCTON, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GUERNSEY, HOCKING, JACKSON, KNOX, LICKING, MADISON, MEIGS, MORGAN, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, ROSS, UNION, VINTON, WASHINGTON

Special Jurisdictional Note : Noble County: (Townships of Beaver, Buffalo, Seneca & Wayne)

Details :

Name of Union: Bricklayer Local 23 (Columbus)

Craft : Bricklayer Effective Date : 06/05/2024 Last Posted : 06/05/2024

[illegible]

90-365 Days	50.02	\$17.72	\$9.68	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$27.40	\$36.26
2nd Year	55.00	\$19.49	\$9.68	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$29.17	\$38.91

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

REQUIRED RATIO

1-2 Journeyman to 1 Apprentice
3- 6 Journeyman to 2 Apprentice
7-10 Journeyman to 3 Apprentice
1-15 Journeyman to 4 Apprentice

MASON TRAINEE REQUIRED RATIO

1 Apprentice permits 1 Mason Trainee
2 Apprentice permits 1 Mason Trainee
3 Apprentice permits 2 Mason Trainee
4 Apprentice permits 2 Mason Trainee

Special Jurisdictional Note :

Details :

MASON TRAINEE: duties shall be to work in all aspects of Masonry construction taking direction from the employer and the Journeyman Bricklayer & Stone Mason's working on the job.

MASON TRAINEE may work on job site only when a registered apprentice is on job and the ratios in above table will be strictly enforced.

Above Journeyman Rate:

Brick Power Saw Pay \$.50

Designated layout person \$.50

Swingstage Work \$1.00 at start, and additional \$2.00 at 24th floor

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FRANKLIN, MADISON, PICKAWAY,
UNION

Prevailing Wage Rate

Skilled Crafts

Name of Union: Bricklayer Local 23 Heavy Hwy (A)

Change # : LCN01-2024ibLoc23HevHwyA

Craft : Bricklayer Effective Date : 06/05/2024 Last Posted : 06/05/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason Bricklayer Sewer Water Works A	\$33.39		\$10.00	\$9.53	\$0.53	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$53.45	\$70.14
Apprentice	Percent											
1st year	70.00	\$23.37	\$10.00	\$9.53	\$0.53	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.43	\$55.12
2nd year	80.00	\$26.71	\$10.00	\$9.53	\$0.53	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.77	\$60.13
3rd year	90.00	\$30.05	\$10.00	\$9.53	\$0.53	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$50.11	\$65.14

Special Calculation Note : NOT FOR BUILDING CONSTRUCTION.

Ratio :

3 Journeymen to 1 Apprentice
6 Journeymen to 2 Apprentice
9 Journeymen to 3 Apprentice
12 Journeymen to 4 Apprentice
15 Journeymen to 5 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

(A) Highway Construction, Sewer, Waterworks And Utility Construction, Industrial & Building Site Heavy Construction, Airport Construction Or Railroad Construction Work.

(B) Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work ,Pollution Control,Sewer Plant, Waste Plant, & Water Treatment Facilities, Construction.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Bricklayer Local 23 Heavy Hwy (B)

Change # : LCN01-2024ibLoc23HevHwyB

Craft : Bricklayer Effective Date : 06/05/2024 Last Posted : 06/05/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason Bricklayer Power Plants Tunnels Amusement Parks B	\$34.39		\$10.00	\$9.52	\$0.54	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$54.45	\$71.65
Apprentice	Percent											
1st year	70.00	\$24.07	\$10.00	\$9.52	\$0.54	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.13	\$56.17
2nd year	80.00	\$27.51	\$10.00	\$9.52	\$0.54	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$47.57	\$61.33
3rd year	90.00	\$30.95	\$10.00	\$9.52	\$0.54	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$51.01	\$66.49

Special Calculation Note : NOT FOR BUILDING CONSTRUCTION.

Ratio :

3 Journeymen to 1 Apprentice
6 Journeymen to 2 Apprentice
9 Journeymen to 2 Apprentice
12 Journeymen to 4 Apprentice
15 Journeymen to 5 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT,

TRUMBULL, TUSCARAWAS, UNION, VAN WERT,
VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

(A) Highway Construction, Sewer, Waterworks And Utility Construction, Industrial & Building Site Heavy Construction, Airport Construction Or Railroad Construction Work.

(B) Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work ,Pollution Control,Sewer Plant, Waste Plant, & Water Treatment Facilities, Construction.

Prevailing Wage Rate Skilled Crafts

Name of Union: Carpenter & Pile Driver Local 200

Change # : LCN01-2024ibLoc200

Craft : Carpenter Effective Date : 05/21/2024 Last Posted : 05/21/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter	\$32.60		\$8.20	\$10.78	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$54.94	\$71.24
Pile Driver	\$33.00		\$8.20	\$10.78	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$55.34	\$71.84
Apprentice paid at % of their rate above	Percent											
1st 6 months	70.00	\$22.82	\$8.20	\$2.00	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$36.38	\$47.79
2nd 6 months	70.00	\$22.82	\$8.20	\$2.00	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$36.38	\$47.79
3rd 6 months	80.00	\$26.08	\$8.20	\$8.62	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$46.26	\$59.30
4th 6 months	80.00	\$26.08	\$8.20	\$8.62	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$46.26	\$59.30
5th 6 months	90.00	\$29.34	\$8.20	\$9.70	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$50.60	\$65.27
6th 6 months	90.00	\$29.34	\$8.20	\$9.70	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$50.60	\$65.27
7th 6 months	95.00	\$30.97	\$8.20	\$10.24	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$52.77	\$68.25
8th 6 months	95.00	\$30.97	\$8.20	\$10.24	\$0.60	\$0.00	\$2.62	\$0.14	\$0.00	\$0.00	\$52.77	\$68.25

Special Calculation Note : Other is UBC National Fund.

Ratio :

1 Journeyman to 1 Apprentice
Thereafter
2 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FAIRFIELD, FRANKLIN, GUERNSEY,
LICKING, MADISON, MARION, MUSKINGUM,
MORGAN, NOBLE, PERRY, PICKAWAY, UNION

The first carpenter on the job shall be a journeyman.
The second carpenter employed may be an apprentice carpenter. After one (1) journeyman and one (1) apprentice are employed, each employer shall employ a

ratio of one (1) apprentice, when available, to two (2) journeyman.

Special Jurisdictional Note :

Details :

CARPENTERS duties shall include but not limited to the milling, fashioning, joining, assembling, erecting, fastening, or dismantling of scaffolding and of material of wood, plastic, metal, fiber, cork and composition, and all other substitute materials. The handling, cleaning, erecting, installing and dismantling of machinery, equipment and all materials used by carpenters.

The building and setting of all concrete forms and decking, and dismantling the same; the setting of templates for anchor bolts for structural members and for machinery, and the placing, leveling and bracing of these bolts; the making of all forms for bulkheads, figures, post, balusters and ornaments. The erection and installation of cooling towers assembled onsite. The building of all barricades and handling of rough lumber and drywall. The installation of all required blocking and all toilet accessories, including but not limited to grab bars, napkin dispensers and receptacles, mirrors and soap dispensers. The installation of metal studs and the welding of studs and other fastenings to receive material being applied by carpenters. The installation of all material used in drywall construction such as plasterboard, transite and other composition boards. The installation of carpet, artificial turf, wood and Resilient floors shall consist of and include the laying of all special designs of wood, wood block, wood composition, cork, linoleum, asphalt, mastic, plastic and rubber tile, whether nailed or laid in, or with linoleum paste or glue compositions. The installation of garage and overhead doors. The installation of fixtures, cabinets, shelving, racks, louvers, etc. The assembling and setting of all seats in theaters, halls, churches, schools, auditoriums, grandstands and other buildings.

Our claim of jurisdiction, therefore, extends over the following subdivisions of the trade. Carpenters and Joiners; Bridge, Dock and Wharf Carpenters, Divers, Underpinners, Timbermen and Core Drillers; Shipwrights, Boat Builders, Ship Carpenters, Joiners and Caulkers, Cabinet Makers, Bench Hands, Stair Builders; Millmen; Wood and Resilient Floor Layers and Finishers; Carpet Layers; Shinglers; Siders; Insulators; Acoustic and Drywall Applicators; Shorers and House Movers; Loggers; Lumber and Sawmill Workers; Furniture Workers; Reed and Rattan Workers; Shingle Weavers; Casket and Coffin Makers; Box Makers; Railroad Carpenters; and Car Builders, regardless of material used; and all those engaged in the operation of woodworking or other machinery required in the fashioning, milling or manufacturing of products used in the trade, or engaged as helpers to any of the above divisions or subdivisions, and the handling, erecting and installing of material on any of the above divisions or subdivisions; burning welding, rigging and the use of any instrument or tool for layout work incidental to the trade. When the term "Carpenter" and "Joiner" is used, it shall mean all the subdivisions of the trade.

PILEDRIIVER:

Where piling is used in the construction and repair of all wharves, docks, piers, trestles, caissons, cofferdams, the erection of all sea walls and breakwaters.

The placing of all walling, bumper guards of wood or metal. The framing, boring, drilling or burning of all holes in the same, all tie and hog rods in connection with Piledrivers work.

The driving, bracing, plumbing, cutting-off and capping of all piling whether wood, steel sheeting, metal pipe piling, composite or concrete.

The heading and splicing of wood piling and the making of woodsheet piling, The welding, cutting or burning of any metal and wood piling and shoring and underpinning in connection with Piledriver work.

The loading and unloading of all piling and other material used in connection with Piledrivers work.

The loading, unloading, erecting, framing, dismantling, moving and handling of all drivers, derrick, cranes and other piledriving equipment used in the work. Drilling in piling or drilled in caissons where a steel liner is used.

All machinery used for handling spuds or anchors on floating equipment used in our work shall be operated by our members. Where swing lines or derricks are used, members shall be used as watchmen.

All underwater and marine work on all bulkheads, wharves, docks, shipyards, caissons, piers, bridges, pipeline work, viaducts, marine cable and trestles, as well as salvage and reclamation work where divers are employed.

All clamming work that is done by floating derricks.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Carpenter Millwright Local 1090 Columbus

Change # : LCN01-2024ibLoc1090Columbus

Craft : Carpenter Effective Date : 05/08/2024 Last Posted : 05/08/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter Millwright	\$33.28		\$8.20	\$10.99	\$0.60	\$0.00	\$6.76	\$0.16	\$0.00	\$0.00	\$59.99	\$76.63
Apprentice	Percent											
1st 6 months	60.00	\$19.97	\$8.20	\$10.99	\$0.60	\$0.00	\$6.76	\$0.16	\$0.00	\$0.00	\$46.68	\$56.66
2nd 6 months	65.00	\$21.63	\$8.20	\$10.99	\$0.60	\$0.00	\$6.76	\$0.16	\$0.00	\$0.00	\$48.34	\$59.16
3rd 6 months	70.00	\$23.30	\$8.20	\$10.99	\$0.60	\$0.00	\$6.76	\$0.16	\$0.00	\$0.00	\$50.01	\$61.65
4th 6 months	75.00	\$24.96	\$8.20	\$10.99	\$0.60	\$0.00	\$6.76	\$0.16	\$0.00	\$0.00	\$51.67	\$64.15
5th 6 months	80.00	\$26.62	\$8.20	\$10.99	\$0.60	\$0.00	\$6.76	\$0.16	\$0.00	\$0.00	\$53.33	\$66.65
6th 6 months	85.00	\$28.29	\$8.20	\$10.99	\$0.60	\$0.00	\$6.76	\$0.16	\$0.00	\$0.00	\$55.00	\$69.14
7th 6 months	90.00	\$29.95	\$8.20	\$10.99	\$0.60	\$0.00	\$6.76	\$0.16	\$0.00	\$0.00	\$56.66	\$71.64
8th 6 months	95.00	\$31.62	\$8.20	\$10.99	\$0.60	\$0.00	\$6.76	\$0.16	\$0.00	\$0.00	\$58.33	\$74.13

Special Calculation Note : Other is for UBC National Fund.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FAIRFIELD, FRANKLIN, GUERNSEY, LICKING, MADISON, MARION, MORGAN, MUSKINGUM, NOBLE, PERRY, PICKAWAY, UNION

Special Jurisdictional Note :

Details :

The term “Millwright and Machine Erectors” jurisdiction shall mean the unloading, hoisting, rigging, skidding, moving, dismantling, aligning, erecting, assembling, repairing, maintenance and adjusting of all structures, processing areas either under cover, underground or elsewhere, required to process material, handle, manufacture or service, be it powered or receiving power manually, by steam, gas, electricity, gasoline, diesel, nuclear, solar,

water, air or chemically, and in industries such as and including, which are identified for the purpose of description, but not limited to, the following: woodworking plants; canning industries; steel mills; coffee roasting plants; paper and pulp; cellophane; stone crushing; gravel and sand washing and handling; refineries; grain storage and handling; asphalt plants; sewage disposal; water plants; laundries; bakeries; mixing plants; can, bottle and bag packing plants; textile mills; paint mills; breweries; milk processing plants; power plants; aluminum processing or manufacturing plants; and amusement and entertainment fields. The installation of mechanical equipment in atomic energy plants; installation of reactors in power plants; installation of control rods and equipment in reactors; and installation of mechanical equipment in rocket missile bases, launchers, launching gantry, floating bases, hydraulic escape doors and any and all component parts thereto, either assembled, semi-assembled or disassembled. The installation of, but not limited to, the following: setting-up of all engines, motors, generators, air compressors, fans, pumps, scales, hoppers, conveyors of all types, sizes and their supports; escalators; man lifts; moving sidewalks; hosts; dumb waiters; all types of feeding machinery; amusement devices; mechanical pin setters and spotters in bowling alleys; refrigeration equipment; and the installation of all types of equipment necessary and required to process material either in the manufacturing or servicing. The handling and installation of pulleys, gears, sheaves, fly wheels, air and vacuum drives, worm drives and gear drivers directly or indirectly coupled to motors, belts, chains, screws, legs, boots, guards, booth tanks, all bin valves, turn heads and indicators, shafting, bearings, cable sprockets cutting all key seats in new and old work, troughs, chippers, filters, calendars, rolls, winders, rewinders, slitters, cutters, wrapping machines, blowers, forging machines, rams, hydraulic or otherwise, planning, extruder, ball, dust collectors, equipment in meat packing plants, splicing or ropes and cables. The laying-out, fabrication and installation of protection equipment including machinery guards, making and setting of templates for machinery, fabrication of bolts, nuts, pans, dripping of holes for any equipment which the Millwrights install regardless of materials; all welding and burning regardless of type, fabrication of all lines, hose or tubing used in lubricating machinery installed by Millwrights; grinding, cleaning, servicing and any machine work necessary for any part of any equipment installed by the Millwrights; and the break-in and trail run of any equipment or machinery installed by the Millwrights. It is agreed the Millwrights shall use the layout tools and optic equipment necessary to perform their work.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Carpenter Millwright Local 1090 Columbus

Change # : LCR01-2023ibLoc1090Columbus

Craft : Carpenter Effective Date : 05/10/2023 Last Posted : 05/10/2023

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter Millwright	\$32.80		\$7.60	\$10.99	\$0.50	\$0.00	\$6.45	\$0.15	\$0.00	\$0.00	\$58.49	\$74.89
Apprentice	Percent											
1st 6 months	60.00	\$19.68	\$7.60	\$10.99	\$0.50	\$0.00	\$6.45	\$0.15	\$0.00	\$0.00	\$45.37	\$55.21
2nd 6 months	65.00	\$21.32	\$7.60	\$10.99	\$0.50	\$0.00	\$6.45	\$0.15	\$0.00	\$0.00	\$47.01	\$57.67
3rd 6 months	70.00	\$22.96	\$7.60	\$10.99	\$0.50	\$0.00	\$6.45	\$0.15	\$0.00	\$0.00	\$48.65	\$60.13
4th 6 months	75.00	\$24.60	\$7.60	\$10.99	\$0.50	\$0.00	\$6.45	\$0.15	\$0.00	\$0.00	\$50.29	\$62.59
5th 6 months	80.00	\$26.24	\$7.60	\$10.99	\$0.50	\$0.00	\$6.45	\$0.15	\$0.00	\$0.00	\$51.93	\$65.05
6th 6 months	85.00	\$27.88	\$7.60	\$10.99	\$0.50	\$0.00	\$6.45	\$0.15	\$0.00	\$0.00	\$53.57	\$67.51
7th 6 months	90.00	\$29.52	\$7.60	\$10.99	\$0.50	\$0.00	\$6.45	\$0.15	\$0.00	\$0.00	\$55.21	\$69.97
8th 6 months	95.00	\$31.16	\$7.60	\$10.99	\$0.50	\$0.00	\$6.45	\$0.15	\$0.00	\$0.00	\$56.85	\$72.43

Special Calculation Note : Other is for UBC National Fund.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FAIRFIELD, FRANKLIN, GUERNSEY, LICKING, MADISON, MARION, MORGAN, MUSKINGUM, NOBLE, PERRY, PICKAWAY, UNION

Special Jurisdictional Note :

Details :

The term "Millwright and Machine Erectors" jurisdiction shall mean the unloading, hoisting, rigging, skidding, moving, dismantling, aligning, erecting, assembling, repairing, maintenance and adjusting of all structures, processing areas either under cover, underground or elsewhere, required to process material, handle, manufacture or service, be it powered or receiving power manually, by steam, gas, electricity, gasoline, diesel, nuclear, solar,

water, air or chemically, and in industries such as and including, which are identified for the purpose of description, but not limited to, the following: woodworking plants; canning industries; steel mills; coffee roasting plants; paper and pulp; cellophane; stone crushing; gravel and sand washing and handling; refineries; grain storage and handling; asphalt plants; sewage disposal; water plants; laundries; bakeries; mixing plants; can, bottle and bag packing plants; textile mills; paint mills; breweries; milk processing plants; power plants; aluminum processing or manufacturing plants; and amusement and entertainment fields. The installation of mechanical equipment in atomic energy plants; installation of reactors in power plants; installation of control rods and equipment in reactors; and installation of mechanical equipment in rocket missile bases, launchers, launching gantry, floating bases, hydraulic escape doors and any and all component parts thereto, either assembled, semi-assembled or disassembled. The installation of, but not limited to, the following: setting-up of all engines, motors, generators, air compressors, fans, pumps, scales, hoppers, conveyors of all types, sizes and their supports; escalators; man lifts; moving sidewalks; hosts; dumb waiters; all types of feeding machinery; amusement devices; mechanical pin setters and spotters in bowling alleys; refrigeration equipment; and the installation of all types of equipment necessary and required to process material either in the manufacturing or servicing. The handling and installation of pulleys, gears, sheaves, fly wheels, air and vacuum drives, worm drives and gear drivers directly or indirectly coupled to motors, belts, chains, screws, legs, boots, guards, booth tanks, all bin valves, turn heads and indicators, shafting, bearings, cable sprockets cutting all key seats in new and old work, troughs, chippers, filters, calendars, rolls, winders, rewinders, slitters, cutters, wrapping machines, blowers, forging machines, rams, hydraulic or otherwise, planning, extruder, ball, dust collectors, equipment in meat packing plants, splicing or ropes and cables. The laying-out, fabrication and installation of protection equipment including machinery guards, making and setting of templates for machinery, fabrication of bolts, nuts, pans, dripping of holes for any equipment which the Millwrights install regardless of materials; all welding and burning regardless of type, fabrication of all lines, hose or tubing used in lubricating machinery installed by Millwrights; grinding, cleaning, servicing and any machine work necessary for any part of any equipment installed by the Millwrights; and the break-in and trail run of any equipment or machinery installed by the Millwrights. It is agreed the Millwrights shall use the layout tools and optic equipment necessary to perform their work.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Carpenter NE District Industrial Dock & Door

Change # : LCN01-2014fbCarpNEStatewide

Craft : Carpenter **Effective Date :** 03/05/2014 **Last Posted :** 03/05/2014

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Carpenter	\$19.70		\$5.05	\$1.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$25.90	\$35.75
Trainee	Percent											
1st Year	60.00	\$11.82	\$5.05	\$1.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$18.02	\$23.93
2nd Year	80.20	\$15.80	\$5.05	\$1.00	\$0.15	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$22.00	\$29.90

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeymen to 1 Trainee

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note : Industrial Dock and Door is the installation of overhead doors, roll up doors and dock leveling equipment

Details :

10/27/10 New Contract jc

Prevailing Wage Rate Skilled Crafts

Name of Union: Cement Mason Local 132 (Columbus)

Change # : LCN02-2024ibLoc132Columbus

Craft : Cement Effective Date : 06/12/2024 Last Posted : 06/12/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	\$33.27		\$8.25	\$4.65	\$0.70	\$0.00	\$2.50	\$0.06	\$0.00	\$0.00	\$49.43	\$66.06
Apprentice	Percent											
1st Year	70.00	\$23.29	\$8.25	\$4.65	\$0.70	\$0.00	\$2.50	\$0.06	\$0.00	\$0.00	\$39.45	\$51.09
2nd Year	80.00	\$26.62	\$8.25	\$4.65	\$0.70	\$0.00	\$2.50	\$0.06	\$0.00	\$0.00	\$42.78	\$56.08
3rd Year	90.00	\$29.94	\$8.25	\$4.65	\$0.70	\$0.00	\$2.50	\$0.06	\$0.00	\$0.00	\$46.10	\$61.07

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time. *Other is International Training.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ASHLAND, COSHOCTON, CRAWFORD, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GUERNSEY, HOCKING, KNOX, LICKING, MADISON, MARION, MORROW, MUSKINGUM, PERRY, PICKAWAY, RICHLAND, ROSS, UNION, VINTON, WYANDOT

Special Jurisdictional Note :

Details :

Working on swing stage, slip scaffold or window jack scaffold shall receive the following rates:

\$0.50 above the regular rate for heights up to fifty (50) feet above grade level

\$1.00 above the regular rate for heights over fifty (50) feet above grade level

Prevailing Wage Rate

Skilled Crafts

Name of Union: Cement Mason Statewide HevHwy

Change # : LCN01-2024ibCementHevHwy

Craft : Cement Mason Effective Date : 05/01/2024 Last Posted : 05/01/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Cement Mason	\$34.74		\$8.80	\$7.65	\$0.75	\$0.00	\$2.25	\$0.07	\$0.00	\$0.00	\$54.26	\$71.63
Apprentice	Percent											
1st Year	70.00	\$24.32	\$8.80	\$7.65	\$0.75	\$0.00	\$2.25	\$0.07	\$0.00	\$0.00	\$43.84	\$56.00
2nd Year	80.00	\$27.79	\$8.80	\$7.65	\$0.75	\$0.00	\$2.25	\$0.07	\$0.00	\$0.00	\$47.31	\$61.21
3rd Year	90.00	\$31.27	\$8.80	\$7.65	\$0.75	\$0.00	\$2.25	\$0.07	\$0.00	\$0.00	\$50.79	\$66.42
4th Year	95.00	\$33.00	\$8.80	\$7.65	\$0.75	\$0.00	\$3.25	\$0.07	\$0.00	\$0.00	\$53.52	\$70.02

Special Calculation Note : Other \$0.07 is for International Training Fund

4th Year Apprentice Rate (95%) is only applicable to the jurisdiction of Local 404, this includes Ashtabula, Cuyahoga, Geauga, Lake, and Lorain counties.

Ratio :

1 Journeymen to 1 Apprentice
2 to 1 thereafter

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA*,
ATHENS, AUGLAIZE, BELMONT, BROWN,
BUTLER, CARROLL, CHAMPAIGN, CLARK,
CLERMONT, CLINTON, COLUMBIANA,
COSHOCOTON, CRAWFORD, CUYAHOGA*,
DARKE, DEFIANCE, DELAWARE, ERIE,
FAIRFIELD, FAYETTE, FRANKLIN, FULTON*,
GALLIA, GEAUGA*, GREENE, GUERNSEY,
HAMILTON, HANCOCK*, HARDIN, HARRISON,
HENRY*, HIGHLAND, HOCKING, HOLMES,
HURON, JACKSON, JEFFERSON, KNOX, LAKE*,
LAWRENCE, LICKING, LOGAN, LORAIN,
LUCAS*, MADISON, MAHONING, MARION,
MEDINA, MEIGS, MERCER, MIAMI, MONROE,
MONTGOMERY, MORGAN, MORROW,
MUSKINGUM, NOBLE, OTTAWA, PAULDING,
PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE,
PUTNAM*, RICHLAND, ROSS, SANDUSKY,
SCIOTO, SENECA, SHELBY, STARK, SUMMIT,
TRUMBULL, TUSCARAWAS, UNION, VAN WERT,
VINTON, WARREN, WASHINGTON, WAYNE,
WILLIAMS, WOOD*, WYANDOT

Special Jurisdictional Note : (A) Highway Construction, Sewer, Waterworks And Utility Construction, Industrial & Building Site, Heavy Construction, Airport Construction Or Railroad Construction Work, Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work, Pollution Control, Sewer Plant, Waste & Water Plant, Water Treatment Facilities Construction.

*For Power Plant, Tunnels, Amusement Park, Athletic Stadium Site Work, Pollution Control, Sewer Plant, Waste & Water Plant, Water Treatment Facility Construction work in the following Counties: Ashtabula, Cuyahoga, Fulton, Geauga, Hancock, Henry, Lake, Lucas, Putnam and Wood Counties, those counties will use the Cement Mason Statewide Heavy Highway Exhibit B District 1 Wage Rate.

Details :

This rate replaces the previous Cement Mason Heavy Highway Statewide Rates (Exhibit A and Exhibit B rates), except for Cement Mason Statewide Heavy Highway Exhibit B Dist 1. sks

Prevailing Wage Rate

Skilled Crafts

Name of Union: Electrical Local 71 High Tension Pipe Type Cable

Change # : LCN01-2024ibLoc71HighTension

Craft : Lineman Effective Date : 02/07/2024 Last Posted : 02/07/2024

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	\$50.66	\$7.25	\$1.52	\$0.51	\$0.00	\$12.16	\$0.75	\$0.00	\$0.00	\$72.85	\$98.18
Certified Lineman Welder	\$50.66	\$7.25	\$1.52	\$0.51	\$0.00	\$12.16	\$0.75	\$0.00	\$0.00	\$72.85	\$98.18
Certified Cable Splicer	\$50.66	\$7.25	\$1.52	\$0.51	\$0.00	\$12.16	\$0.75	\$0.00	\$0.00	\$72.85	\$98.18
Operator A	\$45.39	\$7.25	\$1.36	\$0.45	\$0.00	\$10.89	\$0.75	\$0.00	\$0.00	\$66.09	\$88.79
Operator B	\$40.18	\$7.25	\$1.21	\$0.40	\$0.00	\$9.64	\$0.75	\$0.00	\$0.00	\$59.43	\$79.52
Operator C	\$32.29	\$7.25	\$0.97	\$0.32	\$0.00	\$7.75	\$0.75	\$0.00	\$0.00	\$49.33	\$65.47
Groundman 0-12 months Exp	\$25.33	\$7.25	\$0.76	\$0.25	\$0.00	\$6.08	\$0.75	\$0.00	\$0.00	\$40.42	\$53.08
Groundman 0-12 months Exp w/CDL	\$27.86	\$7.25	\$0.84	\$0.28	\$0.00	\$6.69	\$0.75	\$0.00	\$0.00	\$43.67	\$57.60
Groundman 1 yr or more	\$27.86	\$7.25	\$0.84	\$0.28	\$0.00	\$6.69	\$0.75	\$0.00	\$0.00	\$43.67	\$57.60
Groundman 1 yr or more w/CDL	\$32.92	\$7.25	\$0.99	\$0.33	\$0.00	\$7.90	\$0.75	\$0.00	\$0.00	\$50.14	\$66.60
Equipment Mechanic A	\$40.18	\$7.25	\$1.21	\$0.40	\$0.00	\$9.64	\$0.75	\$0.00	\$0.00	\$59.43	\$79.52
Equipment Mechanic B	\$36.23	\$7.25	\$1.09	\$0.36	\$0.00	\$8.70	\$0.75	\$0.00	\$0.00	\$54.38	\$72.50
Equipment Mechanic C	\$32.29	\$7.25	\$0.97	\$0.32	\$0.00	\$7.75	\$0.75	\$0.00	\$0.00	\$49.33	\$65.47

X-Ray Technician	\$50.66		\$7.25	\$1.52	\$0.51	\$0.00	\$12.16	\$0.75	\$0.00	\$0.00	\$72.85	\$98.18
Apprentice	Percent											
1st 1000 hrs	60.00	\$30.40	\$7.25	\$0.91	\$0.30	\$0.00	\$7.30	\$0.75	\$0.00	\$0.00	\$46.91	\$62.10
2nd 1000 hrs	65.00	\$32.93	\$7.25	\$0.99	\$0.33	\$0.00	\$7.90	\$0.75	\$0.00	\$0.00	\$50.15	\$66.61
3rd 1000 hrs	70.00	\$35.46	\$7.25	\$1.06	\$0.35	\$0.00	\$8.51	\$0.75	\$0.00	\$0.00	\$53.38	\$71.11
4th 1000 hrs	75.00	\$38.00	\$7.25	\$1.14	\$0.38	\$0.00	\$9.12	\$0.75	\$0.00	\$0.00	\$56.64	\$75.63
5th 1000 hrs	80.00	\$40.53	\$7.25	\$1.22	\$0.41	\$0.00	\$9.73	\$0.75	\$0.00	\$0.00	\$59.89	\$80.15
6th 1000 hrs	85.00	\$43.06	\$7.25	\$1.29	\$0.43	\$0.00	\$10.33	\$0.75	\$0.00	\$0.00	\$63.11	\$84.64
7th 1000 hrs	90.00	\$45.59	\$7.25	\$1.37	\$0.46	\$0.00	\$10.94	\$0.75	\$0.00	\$0.00	\$66.36	\$89.16

Special Calculation Note : Other is Health Reimbursement Account

Operator "A"

John Henry Rock Drill, D-6 (or equivalent) and above, Trackhoe Digger, (320 Track excavator), Cranes (greater than 25 tons and less than 45 tons).

Operator "B"

Cranes (greater than 6 tons and up to 25 tons), Backhoes, Road Tractor, Dozer up to D-5, Pressure Digger- wheeled or tracked, all Tension wire Stringing equipment.

Operator "C"

Trench, Backhoe, Riding type vibratory Compactor, Ground Rod Driver, Boom Truck (6 ton & below), Skid Steer Loaders, Material Handler.

*All Operators of cranes 45 ton or larger shall be paid the journeyman rate of pay.

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HARRISON, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, RICHLAND, ROSS, SCIOTO, SHELBY, STARK, SUMMIT, TRUMBULL,

TUSCARAWAS, UNION, VINTON, WARREN,
WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

Heli - Arc Welding will be paid \$.30 above Journeyman rate. Additional compensation of 10% over the Journeyman Lineman and Journeyman Technician for performing work on structures outside of buildings such as water towers, smoke stacks, radio and television towers, more than 75' above the ground.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Electrical Local 71 Outside (Central OH Chapter)

Change # : OCR01-2024ibLoc71CentralOhio

Craft : Lineman Effective Date : 02/09/2024 Last Posted : 02/09/2024

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	\$44.52	\$7.25	\$1.34	\$0.45	\$0.00	\$8.90	\$0.50	\$0.00	\$0.00	\$62.96	\$85.22
Traffic Signal & Lighting Journeyman	\$42.93	\$7.25	\$1.29	\$0.42	\$0.00	\$8.59	\$0.50	\$0.00	\$0.00	\$60.98	\$82.45
Equipment Operator	\$39.11	\$7.25	\$1.17	\$0.39	\$0.00	\$7.82	\$0.50	\$0.00	\$0.00	\$56.24	\$75.79
Groundman 0-12 months (W/O CDL)	\$23.71	\$7.25	\$0.71	\$0.24	\$0.00	\$4.74	\$0.50	\$0.00	\$0.00	\$37.15	\$49.01
Groundman 0-12 Months W/CDL	\$25.71	\$7.25	\$0.77	\$0.26	\$0.00	\$5.18	\$0.50	\$0.00	\$0.00	\$39.67	\$52.53
Groundman greater than 1 Year W/CDL	\$28.11	\$7.25	\$0.84	\$0.28	\$0.00	\$5.62	\$0.50	\$0.00	\$0.00	\$42.60	\$56.66
Traffic Signal Apprentices											
1st 1,000 hours	\$25.76	\$7.25	\$0.77	\$0.26	\$0.00	\$5.15	\$0.50	\$0.00	\$0.00	\$39.69	\$52.57
2nd 1,000 hours	\$27.90	\$7.25	\$0.84	\$0.28	\$0.00	\$5.58	\$0.50	\$0.00	\$0.00	\$42.35	\$56.30
3rd 1,000 hours	\$30.05	\$7.25	\$0.90	\$0.30	\$0.00	\$6.01	\$0.50	\$0.00	\$0.00	\$45.01	\$60.03
4th 1,000 hours	\$32.20	\$7.25	\$0.97	\$0.32	\$0.00	\$6.44	\$0.50	\$0.00	\$0.00	\$47.68	\$63.78
5th 1,000 hours	\$34.34	\$7.25	\$1.03	\$0.34	\$0.00	\$6.87	\$0.50	\$0.00	\$0.00	\$50.33	\$67.50
6th 1,000 hours	\$38.64	\$7.25	\$1.16	\$0.39	\$0.00	\$7.73	\$0.50	\$0.00	\$0.00	\$55.67	\$74.99

Apprentice Lineman	Percent											
1st 1,000 Hours	60.00	\$26.71	\$7.25	\$0.80	\$0.27	\$0.00	\$5.34	\$0.50	\$0.00	\$0.00	\$40.87	\$54.23
2nd 1,000 Hours	65.00	\$28.94	\$7.25	\$0.87	\$0.29	\$0.00	\$5.79	\$0.50	\$0.00	\$0.00	\$43.64	\$58.11
3rd 1,000 Hours	70.00	\$31.16	\$7.25	\$0.93	\$0.31	\$0.00	\$6.23	\$0.50	\$0.00	\$0.00	\$46.38	\$61.97
4th 1,000 Hours	75.00	\$33.39	\$7.25	\$1.00	\$0.33	\$0.00	\$6.68	\$0.50	\$0.00	\$0.00	\$49.15	\$65.84
5th 1,000 Hours	80.00	\$35.62	\$7.25	\$1.07	\$0.36	\$0.00	\$7.12	\$0.50	\$0.00	\$0.00	\$51.92	\$69.72
6th 1,000 Hours	85.00	\$37.84	\$7.25	\$1.14	\$0.38	\$0.00	\$7.57	\$0.50	\$0.00	\$0.00	\$54.68	\$73.60
7th 1,000 Hours	90.00	\$40.07	\$7.25	\$1.20	\$0.40	\$0.00	\$8.01	\$0.50	\$0.00	\$0.00	\$57.43	\$77.46

Special Calculation Note : Other is Health Reimbursement Account

Ratio :

1 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ASHLAND, ATHENS, COSHOCTON, CRAWFORD, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GUERNSEY, HIGHLAND, HOCKING, JACKSON, KNOX, LAWRENCE, LICKING, MADISON, MARION, MEIGS, MONROE, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, RICHLAND, ROSS, SCIOTO, TUSCARAWAS, UNION, VINTON, WASHINGTON

Special Jurisdictional Note :

Details :

A groundman when directed shall assist a Journeyman Lineman, Traffic Signal and Lighting Journeyman or Equipment Operator in the performance of his/her work on the ground, including the use of hand tools. Under no circumstances shall this classification climb poles, towers, or work from an elevated platform or bucket truck. This classification shall not perform work normally assigned to an Apprentice.

No more than three (3) Groundmen shall work alone. Jobs with more than three Groundmen shall be supervised by a Groundcrew Foreman, Journeyman Lineman, Journeyman Traffic Signal Technician or an Equipment Operator.

Scope of Work: installation and maintenance of highway and street lighting, highway and street sign lighting, electronic message boards and traffic control systems, camera systems, traffic signal work, substation and line construction including overhead and underground projects for private and industrial work as in accordance with the IBEW Constitution. This Agreement includes the operation of all tools and equipment necessary for the installation of the above projects.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Electrical Local 71 Outside Utility Power

Change # : LCN01-2024ibLoc7OutsideUtility

Craft : Lineman Effective Date : 02/07/2024 Last Posted : 02/07/2024

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrical Lineman	\$47.99	\$7.25	\$1.44	\$0.48	\$0.00	\$11.52	\$0.75	\$0.00	\$0.00	\$69.43	\$93.42
Substation Technician	\$47.99	\$7.25	\$1.44	\$0.48	\$0.00	\$11.52	\$0.75	\$0.00	\$0.00	\$69.43	\$93.42
Cable Splicer	\$50.26	\$7.25	\$1.51	\$0.50	\$0.00	\$12.06	\$0.75	\$0.00	\$0.00	\$72.33	\$97.46
Operator A	\$43.01	\$7.25	\$1.29	\$0.43	\$0.00	\$10.32	\$0.75	\$0.00	\$0.00	\$63.05	\$84.56
Operator B	\$38.02	\$7.25	\$1.14	\$0.38	\$0.00	\$9.12	\$0.75	\$0.00	\$0.00	\$56.66	\$75.67
Operator C	\$30.52	\$7.25	\$0.92	\$0.31	\$0.00	\$7.32	\$0.75	\$0.00	\$0.00	\$47.07	\$62.33
Groundman 0-12 months Exp	\$24.00	\$7.25	\$0.72	\$0.24	\$0.00	\$5.76	\$0.75	\$0.00	\$0.00	\$38.72	\$50.72
Groundman 0-12 months Exp w/CDL	\$26.40	\$7.25	\$0.79	\$0.26	\$0.00	\$6.33	\$0.75	\$0.00	\$0.00	\$41.78	\$54.98
Groundman 1 yr or more	\$26.40	\$7.25	\$0.79	\$0.26	\$0.00	\$6.33	\$0.75	\$0.00	\$0.00	\$41.78	\$54.98
Groundman 1 yr or more w/CDL	\$31.19	\$7.25	\$0.94	\$0.31	\$0.00	\$7.49	\$0.75	\$0.00	\$0.00	\$47.93	\$63.53
Equipment Mechanic A	\$38.02	\$7.25	\$1.14	\$0.38	\$0.00	\$9.12	\$0.75	\$0.00	\$0.00	\$56.66	\$75.67
Equipment Mechanic B	\$34.28	\$7.25	\$1.03	\$0.34	\$0.00	\$8.23	\$0.75	\$0.00	\$0.00	\$51.88	\$69.02
Equipment Mechanic C	\$30.52	\$7.25	\$0.92	\$0.31	\$0.00	\$7.32	\$0.75	\$0.00	\$0.00	\$47.07	\$62.33
Line Truck w/uuger	\$33.65	\$7.25	\$1.01	\$0.34	\$0.00	\$8.08	\$0.75	\$0.00	\$0.00	\$51.08	\$67.90

Apprentice	Percent											
1st 1000 hrs	60.00	\$28.79	\$7.25	\$0.86	\$0.29	\$0.00	\$6.91	\$0.75	\$0.00	\$0.00	\$44.85	\$59.25
2nd 1000 hrs	65.00	\$31.19	\$7.25	\$0.94	\$0.31	\$0.00	\$7.49	\$0.75	\$0.00	\$0.00	\$47.93	\$63.53
3rd 1000 hrs	70.00	\$33.59	\$7.25	\$1.01	\$0.34	\$0.00	\$8.06	\$0.75	\$0.00	\$0.00	\$51.00	\$67.80
4th 1000 hrs	75.00	\$35.99	\$7.25	\$1.08	\$0.36	\$0.00	\$8.64	\$0.75	\$0.00	\$0.00	\$54.07	\$72.07
5th 1000 hrs	80.00	\$38.39	\$7.25	\$1.15	\$0.38	\$0.00	\$9.21	\$0.75	\$0.00	\$0.00	\$57.13	\$76.33
6th 1000 hrs	85.00	\$40.79	\$7.25	\$1.22	\$0.41	\$0.00	\$9.79	\$0.75	\$0.00	\$0.00	\$60.21	\$80.61
7th 1000 hrs	90.00	\$43.19	\$7.25	\$1.30	\$0.43	\$0.00	\$10.37	\$0.75	\$0.00	\$0.00	\$63.29	\$84.89

Special Calculation Note : Other is Health Reimbursement Account

Operator "A"

John Henry Rock Drill, D-6 (or equivalent) and above, Trackhoe Digger, (320 Track excavator), Cranes (greater than 25 tons and less than 45 tons).

Operator "B"

Cranes (greater than 6 tons and up to 25 tons), Backhoes, Road Tractor, Dozer up to D-5, Pressure Digger- wheeled or tracked, all Tension wire Stringing equipment.

Operator "C"

Trench, Backhoe, Riding type vibratory Compactor, Ground Rod Driver, Boom Truck (6 ton & below), Skid Steer Loaders, Material Handler.

Ratio :

(1) Journeyman Lineman to (1) Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HARRISON, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, RICHLAND, ROSS, SCIOTO, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

Heli - Arc Welding will be paid \$.30 above Journeyman rate. Additional compensation of 10% over the

Journeyman Lineman and Journeyman Technician for performing work on structures outside of buildings such as water towers, smoke stacks, radio and television towers, more than 75' above the ground.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Electrical Local 71 Underground Residential Distribution

Change # : LCN01-2024ibLoc7URD

Craft : Lineman Effective Date : 02/07/2024 Last Posted : 02/07/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
URD Electrician	\$36.41		\$7.25	\$1.09	\$0.36	\$0.00	\$8.74	\$0.75	\$0.00	\$0.00	\$54.60	\$72.80
Equipment Operator A	\$32.57		\$7.25	\$0.98	\$0.33	\$0.00	\$7.82	\$0.75	\$0.00	\$0.00	\$49.70	\$65.98
Equipment Operator B	\$29.91		\$7.25	\$0.90	\$0.30	\$0.00	\$7.18	\$0.75	\$0.00	\$0.00	\$46.29	\$61.25
Directional Drill Locator	\$32.57		\$7.25	\$0.98	\$0.33	\$0.00	\$7.82	\$0.75	\$0.00	\$0.00	\$49.70	\$65.98
Directional Drill Operator	\$29.91		\$7.25	\$0.90	\$0.30	\$0.00	\$7.18	\$0.75	\$0.00	\$0.00	\$46.29	\$61.25
Groundman 0-12 months Exp	\$23.64		\$7.25	\$0.71	\$0.24	\$0.00	\$5.76	\$0.75	\$0.00	\$0.00	\$38.35	\$50.17
Groundman 0-12 months Exp w/CDL	\$26.07		\$7.25	\$0.78	\$0.26	\$0.00	\$6.26	\$0.75	\$0.00	\$0.00	\$41.37	\$54.41
Groundman 1 yr or more	\$26.07		\$7.25	\$0.78	\$0.26	\$0.00	\$6.26	\$0.75	\$0.00	\$0.00	\$41.37	\$54.41
Groundman 1 yr or more w/CDL	\$30.96		\$7.25	\$0.93	\$0.31	\$0.00	\$7.43	\$0.75	\$0.00	\$0.00	\$47.63	\$63.11
Apprentice	Percent											
1st 1000 hrs	80.00	\$29.13	\$7.25	\$0.87	\$0.29	\$0.00	\$6.99	\$0.75	\$0.00	\$0.00	\$45.28	\$59.84
2nd 1000 hrs	85.00	\$30.95	\$7.25	\$0.93	\$0.31	\$0.00	\$7.43	\$0.75	\$0.00	\$0.00	\$47.62	\$63.09
3rd 1000 hrs	90.00	\$32.77	\$7.25	\$0.98	\$0.33	\$0.00	\$7.86	\$0.75	\$0.00	\$0.00	\$49.94	\$66.32

4th 1000 hrs	95.00	\$34.59	\$7.25	\$1.04	\$0.35	\$0.00	\$8.28	\$0.75	\$0.00	\$0.00	\$52.26	\$69.55

Special Calculation Note : Other: Health Reimburstment Account

Ratio :

(1) Journeyman Lineman to (1) Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HARRISON, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, RICHLAND, ROSS, SCIOTO, SHELBY, STARK, SUMMIT, TRUMBULL, TUSCARAWAS, UNION, VINTON, WARREN, WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

This work applies to projects designated for any outside Underground Residential Distribution construction work for electrical utilities, municipalities and rural electrification projects.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Electrical Local 71 Voice Data Video Outside

Change # : LCN02-2024ibLoc71VDV

Craft : Voice Data Video Effective Date : 03/06/2024 Last Posted : 03/06/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Electrical Installer Technician I	\$35.39		\$7.25	\$1.06	\$0.00	\$0.00	\$1.77	\$0.00	\$0.00	\$0.00	\$45.47	\$63.17
Installer Technician II	\$33.37		\$7.25	\$1.00	\$0.00	\$0.00	\$1.67	\$0.00	\$0.00	\$0.00	\$43.29	\$59.97
Installer Repairman	\$33.37		\$7.25	\$1.00	\$0.00	\$0.00	\$1.67	\$0.00	\$0.00	\$0.00	\$43.29	\$59.97
Equipment Operator II	\$24.98		\$7.25	\$0.75	\$0.00	\$0.00	\$1.25	\$0.00	\$0.00	\$0.00	\$34.23	\$46.72
Cable Splicer	\$35.39		\$7.25	\$1.06	\$0.00	\$0.00	\$1.77	\$0.00	\$0.00	\$0.00	\$45.47	\$63.17
Ground Driver W/CDL	\$16.69		\$7.25	\$0.50	\$0.00	\$0.00	\$0.83	\$0.00	\$0.00	\$0.00	\$25.27	\$33.62
Groundman	\$14.57		\$7.25	\$0.44	\$0.00	\$0.00	\$0.73	\$0.00	\$0.00	\$0.00	\$22.99	\$30.28
Trainees	Percent											
Trainee F	50.02	\$17.70	\$7.25	\$0.53	\$0.00	\$0.89	\$0.00	\$0.00	\$0.00	\$0.00	\$26.37	\$35.22
Trainee E	58.00	\$20.53	\$7.25	\$0.62	\$0.00	\$1.03	\$0.00	\$0.00	\$0.00	\$0.00	\$29.43	\$39.69
Trainee D	66.00	\$23.36	\$7.25	\$0.70	\$0.00	\$1.17	\$0.00	\$0.00	\$0.00	\$0.00	\$32.48	\$44.16
Trainee C	74.00	\$26.19	\$7.25	\$0.79	\$0.00	\$1.31	\$0.00	\$0.00	\$0.00	\$0.00	\$35.54	\$48.63
Trainee B	82.00	\$29.02	\$7.25	\$0.87	\$0.00	\$1.45	\$0.00	\$0.00	\$0.00	\$0.00	\$38.59	\$53.10
Trainee A	90.00	\$31.85	\$7.25	\$0.96	\$0.00	\$1.59	\$0.00	\$0.00	\$0.00	\$0.00	\$41.65	\$57.58

Special Calculation Note :

Ratio :

1 Trainee to 1 Journeyman

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA,

GEAUGA, GREENE, GUERNSEY, HAMILTON,
HARRISON, HIGHLAND, HOCKING, HOLMES,
JACKSON, JEFFERSON, KNOX, LAKE,
LAWRENCE, LICKING, LOGAN, LORAIN,
MADISON, MAHONING, MARION, MEDINA,
MEIGS, MERCER, MIAMI, MONROE,
MONTGOMERY, MORGAN, MORROW,
MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE,
PORTAGE, PREBLE, RICHLAND, ROSS, SCIOTO,
SHELBY, STARK, SUMMIT, TRUMBULL,
TUSCARAWAS, UNION, VINTON, WARREN,
WASHINGTON, WAYNE

Special Jurisdictional Note :

Details :

Cable Splicer: Inspect and test lines or cables, analyze results, and evaluate transmission characteristics. Cover conductors with insulation or seal splices with moisture-proof covering. Install, splice, test, and repair cables using tools or mechanical equipment. This will include the splicing of fiber.

Installer Technician I: Must know all aspects of telephone and cable work. This is to include aerial, underground, and manhole work. Must know how to climb and run bucket. Must have all the tools required to perform these tasks. Must be able to be responsible for the safety of the crew at all times. Must also have CDL license and have at least 5 years experience.

Installer Repairman: Perform tasks of repairing, installing, and testing phone and CATV services.

Installer Technician II: Have at least three years of telephone and CATV experience. Must have the knowledge of underground, aerial, and manhole work. Must be able to climb and operate bucket. Must have CDL. Must have all tools needed to perform these tasks.

Equipment Operator II: Able to operate a digger derrick or bucket truck. Have at least 3 years of experience and must have a valid CDL license.

Groundman W/CDL: Must have a valid CDL license and be able to perform tasks such as: climbing poles, pulling down guys, making up material, and getting appropriate tools for the job. Must have at least 5 year's experience.

Groundman: Perform tasks such as: climbing poles, pulling down guys, making up material, and getting appropriate tools for the job. Experience 0-5 years.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Electrical Local 683 Inside Lt Commercial South West

Change # : LCN01-2024ibLoc683InLtComm

Craft : Electrical **Effective Date :** 06/26/2024 **Last Posted :** 06/26/2024

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrician	\$40.50	\$11.55	\$8.49	\$1.16	\$0.00	\$4.00	\$0.00	\$0.00	\$0.00	\$65.70	\$85.95
Welding	\$41.50	\$11.55	\$8.52	\$1.16	\$0.00	\$4.00	\$0.00	\$0.00	\$0.00	\$66.73	\$87.48
Medium Voltage Splicing	\$41.50	\$11.55	\$8.52	\$1.16	\$0.00	\$4.00	\$0.00	\$0.00	\$0.00	\$66.73	\$87.48
Over 100 feet	\$60.75	\$11.55	\$9.09	\$1.16	\$0.00	\$4.00	\$0.00	\$0.00	\$0.00	\$86.55	\$116.92
Level 1 CW 0 to 2000 hours	\$14.42	\$6.67	\$0.43	\$0.88	\$0.00	\$0.43	\$0.10	\$0.00	\$0.00	\$22.93	\$30.14
Level 2 CW 2001 to 4000 hours	\$15.33	\$6.67	\$0.46	\$0.88	\$0.00	\$0.46	\$0.10	\$0.00	\$0.00	\$23.90	\$31.57
Level 3 CW 4001 to 6000 hours	\$16.23	\$6.67	\$0.49	\$0.88	\$0.00	\$0.49	\$0.10	\$0.00	\$0.00	\$24.86	\$32.98
Level 4 CW 6001 to 8000 hours	\$18.03	\$6.67	\$0.54	\$0.88	\$0.00	\$0.54	\$0.10	\$0.00	\$0.00	\$26.76	\$35.78

Level 1 CE 8001 to 10000 hours	\$19.83		\$6.67	\$0.59	\$0.88	\$0.00	\$0.59	\$0.10	\$0.00	\$0.00	\$28.66	\$38.58
Level 2 CE 10,001 to 12,000 hours	\$21.64		\$6.67	\$0.65	\$0.88	\$0.00	\$0.65	\$0.10	\$0.00	\$0.00	\$30.59	\$41.41
Level 3 CE 12,001 to14,000 hours	\$27.05		\$6.67	\$0.81	\$0.88	\$0.00	\$0.81	\$0.10	\$0.00	\$0.00	\$36.32	\$49.85
Apprentice	Percent											
0-1000 hrs 1st Period	50.00	\$20.25	\$11.55	\$4.25	\$1.16	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$37.21	\$47.33
1001-2000 hrs 2nd Period	55.00	\$22.28	\$11.55	\$4.67	\$1.16	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$39.66	\$50.79
2001-3500 hrs 3rd Period	60.00	\$24.30	\$11.55	\$5.09	\$1.16	\$0.00	\$2.40	\$0.00	\$0.00	\$0.00	\$44.50	\$56.65
3501-5000 hrs 4th Period	65.02	\$26.33	\$11.55	\$5.52	\$1.16	\$0.00	\$2.60	\$0.00	\$0.00	\$0.00	\$47.16	\$60.33
5001-6500 hrs 5th Period	70.00	\$28.35	\$11.55	\$5.94	\$1.16	\$0.00	\$2.80	\$0.00	\$0.00	\$0.00	\$49.80	\$63.97
6501-8000 hrs 6th Period	80.00	\$32.40	\$11.55	\$6.79	\$1.16	\$0.00	\$3.20	\$0.00	\$0.00	\$0.00	\$55.10	\$71.30

Special Calculation Note : Other for CW/CE: Education Fund

Ratio :

1 to 3 Journeyman to 2 Apprentices
4 to 6 Journeyman to 4 Apprentices

Jurisdiction (* denotes special jurisdictional note) :

CHAMPAIGN, CLARK, DELAWARE, FAIRFIELD, FRANKLIN,
MADISON, PICKAWAY*, UNION

Ratio

Construction Wireman and Construction Electrician
1 Journeyman to 2 Apprentices to 2 CW/CE
With a MAXIMUM of 12 CW/CE an on any jobsite

Construction Wireman and Construction Electricians may work on residential projects without working under the supervision of a Journeyman Wireman. On ALL other job sites, Construction Wireman and Construction Electricians CAN only be employed after an APPRENTICE IS EMPLOYED on the job site.

Special Jurisdictional Note : In Pickaway County the following townships: Circleville, Darby, Harrison, Jackson, Madison, Monroe, Muhlenberg, Scioto, Walnut, Washington.

Details :

The scope of work for the light commercial agreement shall apply to the following facilities not to exceed 200,000 square feet; office buildings, shopping centers, auto sales agencies and garages, churches, funeral homes, nursing homes, hotels, retail and wholesale facilities, small stand-alone manufacturing facilities when free standing and not part of a larger facility (not to exceed 50,000 square fee), solar projects (500 panels or less) unless otherwise covered under the agreement, lighting retrofits (when not associated with remodels involving branch re-circuiting) lighting retrofits shall be defined as the changing of lamps and ballasts in existing light fixtures and shall also include the one for one replacement of existing fixtures, warehouses, gas stations, food service centers, restaurants, entertainment facilities, hospitals, clinics, motels, residential buildings.

Prevailing Wage Rate Skilled Crafts

Name of Union: Electrical Local 683 Inside

Change # : LCN01-2024ibLoc683In

Craft : Electrical Effective Date : 06/26/2024 Last Posted : 06/26/2024

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Electrician	\$40.50	\$11.55	\$8.49	\$1.16	\$0.00	\$4.00	\$0.00	\$0.00	\$0.00	\$65.70	\$85.95
Welding	\$41.50	\$11.55	\$8.52	\$1.16	\$0.00	\$4.00	\$0.00	\$0.00	\$0.00	\$66.73	\$87.48
Medium Voltage Splicing	\$41.50	\$11.55	\$8.52	\$1.16	\$0.00	\$4.00	\$0.00	\$0.00	\$0.00	\$66.73	\$87.48
Over 100 feet	\$60.75	\$11.55	\$9.09	\$1.16	\$0.00	\$4.00	\$0.00	\$0.00	\$0.00	\$86.55	\$116.92
Level 1 CW 0 to 2000 hours	\$14.42	\$6.67	\$0.43	\$0.88	\$0.00	\$0.43	\$0.10	\$0.00	\$0.00	\$22.93	\$30.14
Level 2 CW 2001 to 4000 hours	\$15.33	\$6.67	\$0.46	\$0.88	\$0.00	\$0.46	\$0.10	\$0.00	\$0.00	\$23.90	\$31.57
Level 3 CW 4001 to 6000 hours	\$16.23	\$6.67	\$0.49	\$0.88	\$0.00	\$0.49	\$0.10	\$0.00	\$0.00	\$24.86	\$32.98
Level 4 CW 6001 to 8000 hours	\$18.03	\$6.67	\$0.54	\$0.88	\$0.00	\$0.54	\$0.10	\$0.00	\$0.00	\$26.76	\$35.78

Level 1 CE 8001 to 10000 hours	\$19.83		\$6.67	\$0.59	\$0.88	\$0.00	\$0.59	\$0.10	\$0.00	\$0.00	\$28.66	\$38.58
Level 2 CE 10,001 to 12,000 hours	\$21.64		\$6.67	\$0.65	\$0.88	\$0.00	\$0.65	\$0.10	\$0.00	\$0.00	\$30.59	\$41.41
Level 3 CE 12,001 to14,000 hours	\$27.05		\$6.67	\$0.81	\$0.88	\$0.00	\$0.81	\$0.10	\$0.00	\$0.00	\$36.32	\$49.85
Apprentice	Percent											
0-1000 hrs 1st Period	50.00	\$20.25	\$11.55	\$4.25	\$1.16	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$37.21	\$47.33
1001-2000 hrs 2nd Period	55.00	\$22.28	\$11.55	\$4.67	\$1.16	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$39.66	\$50.79
2001-3500 hrs 3rd Period	60.00	\$24.30	\$11.55	\$5.09	\$1.16	\$0.00	\$2.40	\$0.00	\$0.00	\$0.00	\$44.50	\$56.65
3501-5000 hrs 4th Period	65.02	\$26.33	\$11.55	\$5.52	\$1.16	\$0.00	\$2.60	\$0.00	\$0.00	\$0.00	\$47.16	\$60.33
5001-6500 hrs 5th Period	70.00	\$28.35	\$11.55	\$5.94	\$1.16	\$0.00	\$2.80	\$0.00	\$0.00	\$0.00	\$49.80	\$63.97
6501-8000 hrs 6th Period	80.00	\$32.40	\$11.55	\$6.79	\$1.16	\$0.00	\$3.20	\$0.00	\$0.00	\$0.00	\$55.10	\$71.30

Special Calculation Note : Other for CW/CE: Education Fund

Ratio :

1 to 3 Journeyman to 2 Apprentices
4 to 6 Journeyman to 4 Apprentices

Jurisdiction (* denotes special jurisdictional note) :

CHAMPAIGN, CLARK, DELAWARE, FAIRFIELD, FRANKLIN,
MADISON, PICKAWAY*, UNION

Ratio

Construction Wireman and Construction Electrician
1 Journeyman to 2 Apprentices to 2 CW/CE
With a MAXIMUM of 12 CW/CE an on any jobsite

Construction Wireman and Construction Electricians may work on residential projects without working under the supervision of a Journeyman Wireman. On ALL other job sites, Construction Wireman and Construction Electricians CAN only be employed after an APPRENTICE IS EMPLOYED on the job site.

Special Jurisdictional Note : In Pickaway County the following townships: Circleville, Darby, Harrison, Jackson, Madison, Monroe, Muhlenberg, Scioto, Walnut, Washington.

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Electrical Local 683 Voice Data Video

Change # : LCN01-2024ibLoc683VDV

Craft : Voice Data Video Effective Date : 06/26/2024 Last Posted : 06/26/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Electrical Installer Technician B	\$30.00		\$9.77	\$3.65	\$0.80	\$0.00	\$3.00	\$0.69	\$0.00	\$0.00	\$47.91	\$62.91
Installer Technician A	\$31.25		\$9.77	\$3.69	\$0.80	\$0.00	\$3.00	\$0.72	\$0.00	\$0.00	\$49.23	\$64.85
Cable Puller	\$15.00		\$9.77	\$0.45	\$0.80	\$0.00	\$3.00	\$0.35	\$0.00	\$0.00	\$29.37	\$36.87
Apprentices	Percent											
1st Period 0-1000 hours	55.00	\$16.50	\$9.77	\$3.25	\$0.80	\$0.00	\$3.00	\$0.38	\$0.00	\$0.00	\$33.70	\$41.95
2nd Period 1001- 2000 hours	60.00	\$18.00	\$9.77	\$3.29	\$0.80	\$0.00	\$3.00	\$0.42	\$0.00	\$0.00	\$35.28	\$44.28
3rd Period 2001-3000 hours	65.00	\$19.50	\$9.77	\$3.34	\$0.80	\$0.00	\$3.00	\$0.45	\$0.00	\$0.00	\$36.86	\$46.61
4th Period 3001-4000 hours	70.00	\$21.00	\$9.77	\$3.38	\$0.80	\$0.00	\$3.00	\$0.49	\$0.00	\$0.00	\$38.44	\$48.94
5th Period 4001-5000	75.00	\$22.50	\$9.77	\$3.43	\$0.80	\$0.00	\$3.00	\$0.52	\$0.00	\$0.00	\$40.02	\$51.27

hours												
6th Period 5001-6000 hours	80.00	\$24.00	\$9.77	\$3.47	\$0.80	\$0.00	\$3.00	\$0.55	\$0.00	\$0.00	\$41.59	\$53.59

Special Calculation Note : Other is Holiday Pay. Vacation applies only to employees who work for one employer for a period of one year.

Ratio :

1 Apprentice for every 1 Installer Technician

Cable Pullers can only be employed after an apprentice is employed on the job

Jurisdiction (* denotes special jurisdictional note) :

CHAMPAIGN, CLARK, DELAWARE, FAIRFIELD, FRANKLIN, MADISON, PICKAWAY*, UNION

Special Jurisdictional Note : In Pickaway County the following townships: Circleville, Darby, Harrison, Jackson, Madison, Monroe, Muhlenberg, Scioto, Walnut, Washington.

Details :

An employee who is required to wear an electronic device after hours will receive an additional 1.00 per hour for all hours worked.

HOLIDAYS: Memorial Day, 4th of July, Labor Day, Thanksgiving Day, Christmas Day, New Years Day.

The following work is EXCLUDED from the Teledata Technician work scope:

- Installation of computer systems in industrial applications such as assembly lines, robotics, computer controller manufacturing systems.
- Installation of conduit &/or raceways shall be installed by Inside Wireman . On sites where there is no Inside Wireman employed, the Teledata Technician may install raceway, or conduit not greater than 10 foot.
- Fire Alarm work is excluded on all new construction sites or wherever the fire alarm system is installed in conduit
- All HVAC control work.

TECHNICIAN (A) is a Technician B who holds a current Technician Certification from BICSI (Building Industry Consulting Service International, Inc.)

CABLE PULLERS are for the installation of cable from one termination point to another.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Elevator Local 37

Change # : LCN01-2023ibLoc37

Craft : Elevator Effective Date : 01/01/2024 Last Posted : 12/27/2023

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Elevator Mechanic	\$54.93		\$16.17	\$10.86	\$0.75	\$4.39	\$10.10	\$0.00	\$0.00	\$0.00	\$97.20	\$124.66
Helper	\$38.45		\$16.17	\$10.86	\$0.75	\$3.07	\$10.10	\$0.00	\$0.00	\$0.00	\$79.40	\$98.62
Apprentice	Percent											
Probationary Apprentice	50.01	\$27.47	\$0.00	\$0.00	\$0.00	\$1.64	\$0.00	\$0.00	\$0.00	\$0.00	\$29.11	\$42.85
1st Year	55.00	\$30.21	\$16.17	\$10.86	\$0.75	\$1.81	\$10.10	\$0.00	\$0.00	\$0.00	\$69.90	\$85.01
2nd Year	65.00	\$35.70	\$16.17	\$10.86	\$0.75	\$2.14	\$10.10	\$0.00	\$0.00	\$0.00	\$75.72	\$93.58
3rd Year	70.00	\$38.45	\$16.17	\$10.86	\$0.75	\$2.30	\$10.10	\$0.00	\$0.00	\$0.00	\$78.63	\$97.86
4th Year	80.00	\$43.94	\$16.17	\$10.86	\$0.75	\$2.63	\$10.10	\$0.00	\$0.00	\$0.00	\$84.45	\$106.43
Assistant Mechanic	80.00	\$43.94	\$16.17	\$10.86	\$0.75	\$3.51	\$10.10	\$0.00	\$0.00	\$0.00	\$85.33	\$107.31

Special Calculation Note :

Ratio :

1 Journeyman to 1 Apprentice**

1 Journeyman to 1 Helper**

1 Journeyman to 1 Assistant Mechanic**

Jurisdiction (* denotes special jurisdictional note) :

ATHENS, CHAMPAIGN, CLARK, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GUERNSEY, HOCKING, JACKSON, KNOX, LAWRENCE, LICKING, LOGAN, MADISON, MARION, MEIGS, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, ROSS, UNION, VINTON

Special Jurisdictional Note :

Details :

****Art. 10 Par. 2 Apprentice Work Qualifications:**

Par 2- The total number of Helpers and Apprentices employed shall not exceed the number of Mechanics on any one job, except on jobs where two teams or more are working, one extra Helper or Apprentice may be employed for the first two teams and an extra Helper or Apprentice for each additional three teams.

Further, the Company may use as many Helpers and Apprentices as best suits his convenience under the direction of a Mechanic in wrecking old plants and in handling and hoisting material, and on foundation work. When removing old and installing new cable on existing elevator installations, the Company may use two Helpers or Apprentices to one Mechanic.

Prevailing Wage Rate Skilled Crafts

Name of Union: Glazier Local 372

Change # : LCN01-2024ibLoc372

Craft : Glazier Effective Date : 03/27/2024 Last Posted : 03/27/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Glazier	\$31.32		\$6.20	\$10.14	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.11	\$63.77
Apprentice	Percent											
1st Year	70.00	\$21.92	\$6.20	\$2.84	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$31.41	\$42.38
2nd Year	75.00	\$23.49	\$6.20	\$2.84	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$32.98	\$44.73
3rd Year	85.00	\$26.62	\$6.20	\$6.55	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$39.82	\$53.13
4th Year	95.00	\$29.75	\$6.20	\$6.55	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$42.95	\$57.83

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FAIRFIELD, FAYETTE*, FRANKLIN, HOCKING, JACKSON, KNOX, LICKING, MADISON, MARION, MORROW, MUSKINGUM, PERRY, PICKAWAY, PIKE, ROSS, UNION, VINTON

Special Jurisdictional Note : Fayette County - locations west of State Route 62 ONLY.

Details :

A premium of one dollar (\$1.00) per hour above regular hourly rate of pay shall be paid for each hour worked by every employee from any mechanical lift or scaffold, either suspended or supported including the Hex type scaffolding.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Ironworker Local 172

Change # : LCN01-2024ibLoc172

Craft : Ironworker Effective Date : 06/12/2024 Last Posted : 06/12/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Ironworker	\$36.77		\$9.20	\$9.50	\$0.71	\$0.00	\$3.50	\$0.06	\$0.00	\$0.00	\$59.74	\$78.12
Rigger Welder Reinforcing Sheeter Fence Erector Machinery Mover	\$36.77		\$9.20	\$9.50	\$0.71	\$0.00	\$3.50	\$0.06	\$0.00	\$0.00	\$59.74	\$78.12
Apprentice	Percent											
1st Year 0-1500 Hours	70.00	\$25.74	\$9.20	\$9.50	\$0.71	\$0.00	\$3.50	\$0.06	\$0.00	\$0.00	\$48.71	\$61.58
2nd Year 1501-3000 Hours	80.00	\$29.42	\$9.20	\$9.50	\$0.71	\$0.00	\$3.50	\$0.06	\$0.00	\$0.00	\$52.39	\$67.09
3rd Year 3001-4500 Hours	90.02	\$33.10	\$9.20	\$9.50	\$0.71	\$0.00	\$3.50	\$0.06	\$0.00	\$0.00	\$56.07	\$72.62

Special Calculation Note : Other is for Safety & Training Fund

Ratio :

Rod Work
3 Journeymen to 1 Apprentice

Structural Work
3 Journeymen to 1 Apprentice

Finishing, Steel Sash, Stairway and Ornamental
1 Journeymen to 1 Apprentice

Sheet Gang
1 Apprentice for every sheeting gang per project

Jurisdiction (* denotes special jurisdictional note) :

CHAMPAIGN*, CLARK, CRAWFORD*, DELAWARE, FAIRFIELD, FAYETTE*, FRANKLIN, HARDIN*, HIGHLAND*, HOCKING, JACKSON*, KNOX, LICKING, LOGAN*, MADISON*, MARION, MORROW, PERRY, PICKAWAY, PIKE, ROSS, UNION, VINTON, WYANDOT*

Special Jurisdictional Note : Champaign County Twps included: Wayne, Rush, Goshen. Crawford County Twps included: Bucyrus, Dallas, Jefferson, Jackson, Whetstone, Polk, Sandusky. Fayette

County Twps included: Paint, Marion, Perry, Madison, Wayne, Union. Hardin County Twps included: McDonald, Taylorcreek, Hale, Dudley, Pleasant, Goshen, Blanchard, Lynn, Jackson, Buck, Cessna, Marion, Washington. Highland County Twps included: Madison. Jackson County Twps included: Liberty, Washington, Milton, Jackson, Coal, Wilkesville. Logan County Twps included: Monroe, Zane, Jefferson, Perry, Rush Creek, Bokes Creek. Madison County Twps included: Range, Paint, Fairfield, Sommerford, Jefferson, Pike, Canaan, Pleasant, Oak Run, Union, Deer Creek, Monroe, Darby. Pike County Twps included: Perry, Benton, Mifflin, Sunfish, Newton, Prebble, Pee Pee, Seal, Beaver, Jackson. Wyandot County Twps included: Jackson, Marseilles, Mifflin, Pitt, Antrim. Muskingum County includes: Jackson, Licking, Hope Well, Newton, Clay, Cass, Muskingum falls, Springfield, Madison, Washington, Wayne, Brush Creek.

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Labor HevHwy 3

Change # : LCN01-2024ibLocalHevHwy3

Craft : Laborer Group 1 Effective Date : 05/01/2024 Last Posted : 05/01/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Laborer Group 1	\$35.52		\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$50.12	\$67.88
Group 2	\$35.69		\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$50.29	\$68.13
Group 3	\$36.02		\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$50.62	\$68.63
Group 4	\$36.47		\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$51.07	\$69.30
Watch Person	\$28.25		\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$42.85	\$56.98
Apprentice	Percent											
0-1000 hrs	60.00	\$21.31	\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$35.91	\$46.57
1001-2000 hrs	70.00	\$24.86	\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$39.46	\$51.90
2001-3000 hrs	80.00	\$28.42	\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$43.02	\$57.22
3001-4000 hrs	90.00	\$31.97	\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$46.57	\$62.55
More than 4000 hrs	100.00	\$35.52	\$8.40	\$4.15	\$0.45	\$0.00	\$1.50	\$0.00	\$0.10	\$0.00	\$50.12	\$67.88

Special Calculation Note : Watchmen have no Apprentices. Tunnel Laborer rate with air-pressurized add \$1.00 to the above wage rate.

Ratio :

1 Journeymen to 1 Apprentice
3 Journeymen to 1 Apprentice thereafter

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW,

MUSKINGUM, NOBLE, PAULDING, PERRY,
PICKAWAY, PIKE, PREBLE, PUTNAM, RICHLAND,
ROSS, SCIOTO, SENECA, SHELBY,
TUSCARAWAS, UNION, VAN WERT, VINTON,
WARREN, WASHINGTON, WAYNE, WILLIAMS,
WYANDOT

Special Jurisdictional Note : Hod Carriers and Common Laborers - Heavy, Highway, Sewer, Waterworks, Utility, Airport, Railroad, Industrial and Building Site, Sewer Plant, Waste Water Treatment Facilities Construction

Details :

Group 1

Laborer (Construction); Plant Laborer or Yardman, Right-of-way Laborer, Landscape Laborer, Highway Lighting Worker, Signalization Worker, (Swimming) Pool Construction Laborer, Utility Man, *Bridge Man, Handyman, Joint Setter, Flagperson, Carpenter Helper, Waterproofing Laborer, Slurry Seal, Seal Coating, Surface Treatment or Road Mix Laborer, Riprap Laborer & Grouter, Asphalt Laborer, Dump Man (batch trucks), Guardrail & Fence Installer, Mesh Handler & Placer, Concrete Curing Applicator, Scaffold Erector, Sign Installer, Hazardous Waste (level D), Diver Helper, Zone Person and Traffic Control.

*Bridge Man will perform work as per the October 31, 1949, memorandum on concrete forms, by and between the United Brotherhood of Carpenters and Joiners of America and the Laborers' International Union of North America, which states in; "the moving, cleaning, oiling and carrying to the next point of erection, and the stripping of forms which are not to be re-used, and forms on all flat arch work shall be done by members of the Laborers' International Union of North America."

Group 2

Asphalt Raker, Screwman or Paver, Concrete Puddler, Kettle Man (pipeline), All Machine-Driven Tools (Gas, Electric, Air), Mason Tender, Brick Paver, Mortar Mixer, Skid Steer, Sheeting & Shoring Person, Surface Grinder Person, Screedperson, Water Blast, Hand Held Wand, Power Buggy or Power Wheelbarrow, Paint Striper, Plastic fusing Machine Operator, Rodding Machine Operator, Pug Mill Operator, Operator of All Vacuum Devices Wet or Dry, Handling of all Pumps 4 inches and under (gas, air or electric), Diver, Form Setter, Bottom Person, Welder Helper (pipeline), Concrete Saw Person, Cutting with Burning Torch, Pipe Layer, Hand Spiker (railroad), Underground Person (working in sewer and waterline, cleaning, repairing and reconditioning). Tunnel Laborer (without air), Caisson, Cofferdam (below 25 feet deep), Air Track and Wagon Drill, Sandblaster Nozzle Person, Hazardous Waste (level B), ***Lead Abatement, Hazardous Waste (level C)

***Includes the erecting of structures for the removal, including the encapsulation and containment of Lead abatement process.

Group 3

Blast and Powder Person, Muckers will be defined as shovel men working directly with the miners, Wrencher (mechanical joints & utility pipeline), Yarnier, Top Lander, Hazardous Waste (level A), Concrete Specialist, Curb Setter and Cutter, Grade Checker, Concrete Crew in Tunnels. Utility pipeline Tappers, Waterline, Caulker, Signal Person will receive the rate equal to the rate paid the Laborer classification for which the Laborer is signaling.

Group 4

Miner, Welder, Guniting Nozzle Person

A.) The Watchperson shall be responsible to patrol and maintain a safe traffic zone including but not limited to barrels, cones, signs, arrow boards, message boards etc.

The responsibility of a watchperson is to see that the equipment, job and office trailer etc. are secure.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Labor Local 423

Change # : LCN01-2024ibLoc423

Craft : Laborer Effective Date : 06/12/2024 Last Posted : 06/12/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Laborer Group 1	\$31.48		\$8.40	\$4.15	\$0.40	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$45.53	\$61.27
Group 2	\$31.79		\$8.40	\$4.15	\$0.40	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$45.84	\$61.74
Group 3	\$32.10		\$8.40	\$4.15	\$0.40	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$46.15	\$62.20
Group 4	\$32.41		\$8.40	\$4.15	\$0.40	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$46.46	\$62.66
Apprentice	Percent											
0-1000 hrs	70.00	\$22.04	\$8.40	\$4.15	\$0.40	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$36.09	\$47.10
1001-2000 hrs	80.00	\$25.18	\$8.40	\$4.15	\$0.40	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$39.23	\$51.83
2001-3000 hrs	90.00	\$28.33	\$8.40	\$4.15	\$0.40	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$42.38	\$56.55
3001-4000 hrs	95.00	\$29.91	\$8.40	\$4.15	\$0.40	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$43.96	\$58.91
More than 4000 hrs	100.00	\$31.48	\$8.40	\$4.15	\$0.40	\$0.00	\$1.00	\$0.00	\$0.10	\$0.00	\$45.53	\$61.27

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

1 Journeymen to 1 Apprentice
4 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

FAIRFIELD, FAYETTE, FRANKLIN, HOCKING, LICKING, MADISON, PICKAWAY, UNION

Special Jurisdictional Note :

Details :

Group 1:

General Laborers, Carpenter Tender, Cathodic Protection, Cleaning Debris, Cleaning of all Material, General Clean-up including Vacuum Cleaning, Scraping and Cleaning of Walls and Floors, Landscape, Installation and Removal of Fencing, Sod Layers, All Portable Heaters, Flagman, Loading and Unloading of all Trucks, Handling and conveying all Materials, Washing of all Windows, Conveyor Belt, All Water Pumps up to and including three (3) inch intake, Watchman, Water Boy and Tool Room Attendant.

Group 1- Swimming Pools, Pool Decks, Surrounding Sidewalk and Parking Garages.

Group 2:

Skid Steer, Concrete Specialists, Brick Tender, Stone Mason Tender, Plaster Tender, Mortar Mixer and Operator, Cement Mason Tender, Construction Specialist, All Scaffold Builders (Swinging Scaffolds), Lagging, Bush Hammering, Jack Hammer Operator, Air or Electric Pneumatic Tool Operator, Power Driven Tools, Power Buggy Operators, Pouring and Placement of all concrete, Fork Lift Operators, Power Wheelbarrow Operators, Asphalt and Blacktop Rakers, Wrecker/Demolition, Sand Blasting and Chipping, Welders on Demolition, Grade Checkers, a person on a bucket pouring concrete, Guniting Nozzle man, Wagon and Churn Drill Operator, Concrete Saw Operator, Brush Feeders on pulverizers, Pipe Layers, Bottom Man, Laser Gun, Burners, Sand Blasting of concrete, Vibrator Man, Steward, Signal Man, Caisson, Caisson Bottom Man, Piledrivers, Asbestos and Lead Abatement Laborers.

Hazardous Waste (Level B): Any work requiring the following protective equipment must be paid at Group 2 rate,

A protective suit and an Air Purifying Respirator (APR) with the appropriate filter canisters. The ensemble is used when contaminants are reliably known not to be hazardous to the skin and not IDLH (Immediately Dangerous To Life or Health) and correct filter protection is available. This ensemble offers adequate protection for many jobs. Heat stress may be a problem due to inherent restrictions to breathing in an APR. Also, normal job related injury risk will be nearly as high as for Level C Equipment.

Group 3 Hazardous (Level C:) Any work requiring the following protective equipment must be paid at Group 3 rate,

A chemically resistant splash suit and a (SCBA) or Airline Respirator. This ensemble is required when the situation is very hazardous, such as oxygen deficient atmospheres, IDLH atmospheres, or confined space entries, but the risk of skin exposure is not as great as in Level D situations. Then Level C ensemble gives the second highest level of protection, but also puts physical stress on the worker; primarily heat stress, reduced vision, dexterity and mobility directly attributable to wearing of the protective equipment. Therefore, in addition to the hazardous material, the hazard of the normal job related injuries is greatly increased.

Group 4 Hazardous Waste (Level D) requiring the following protective equipment must be paid at Group 4 rate, Protective equipment is required when the area has been known to contain extremely toxic contaminants or contaminants unknown but may be expected to be extremely toxic and /or Immediately Dangerous to Life and Health (IDLH). This ensemble includes fully encapsulated chemical suit (moon suit), Self Contained Breathing Apparatus (SCBA), or Airline Fed Respirator, and various types and numbers of boots and gloves, cool vests and voice activated radios are optional equipment sometimes worn. Level D ensembles provide the highest level of protection from contaminants but places the greatest physical and mental stress on the worker. The claustrophobic environment of the moon suit causes anxiety in most people, which greatly increases the already inherent heat stress problems. Also, this ensemble reduces vision, mobility, dexterity, and communication capacity, all of which increases the risk of normal job related injuries, ie., slips, falls, caught between, etc

Hazardous Pay of \$0.25 per hour shall be paid in addition to classifications shown above

Swing Scaffolds (suspended by rope or pulley), and swing scaffolds for grain storage tank or grain elevators, when the work is performed at a height of fifty (50) feet or more above the foundations or grade level, whichever is higher. Caisson work and tunnel work (depth being 15 feet or deeper)

Hazardous Waste Removal & Lead Abatement Workers: Exclusive of "Hot" area with toxic or hazardous materials, when one of the following personal protective equipment ensembles will be required for necessary protection against toxic contaminants. All of the ensembles increase the risks of certain types of worker-related injuries. When Laborers complement another craft receiving premium rate of pay Laborers will also receive premium pay for this "HOT" type of work.

[illegible]

1st Year	50.00	\$22.07	\$9.26	\$6.25	\$0.90	\$0.00	\$0.00	\$0.09	\$0.00	\$0.10	\$38.67	\$49.71
2nd Year	60.00	\$26.48	\$9.26	\$6.25	\$0.90	\$0.00	\$0.00	\$0.09	\$0.00	\$0.10	\$43.08	\$56.33
3rd Year	70.00	\$30.90	\$9.26	\$6.25	\$0.90	\$0.00	\$0.00	\$0.09	\$0.00	\$0.10	\$47.50	\$62.95
4th Year	80.00	\$35.31	\$9.26	\$6.25	\$0.90	\$0.00	\$0.00	\$0.09	\$0.00	\$0.10	\$51.91	\$69.57

Special Calculation Note : Other: Education & Safety

Misc: National Training

Ratio :

For every (3) Operating Engineer Journeymen employed by the company there may be employed (1) Registered Apprentice or trainee Engineer through the referral when they are available. An apprentice, while employed as part of a crew per Article VIII, paragraph 78, will not be subject to the apprenticeship ratios in this collective bargaining agreement

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WYANDOT

Special Jurisdictional Note :

Details :

Note: There will be a 10% increase for the apprentices on top of the percentages listed above provided they are operating mobile equipment. Mechanic Trainees will receive 10% increase if required to have CDL

Group A- Barrier Moving Machines; Boiler Operators or Compressor Operators, when compressor or boiler is mounted on crane (Piggyback Operation); Boom Trucks (all types); Cableways Cherry Pickers; Combination - Concrete Mixers & Towers; All Concrete Pumps with Booms; Cranes (all types); Compact Cranes, track or rubber over 4,000 pounds capacity; Cranes self-erecting, stationary, track or truck (all configurations); Derricks (all types); Draglines; Dredges (dipper, clam or suction) 3-man crew; Elevating Graders or Euclid Loaders; Floating Equipment; Forklift (rough terrain with winch/hoist); Gradalls; Helicopter Operators, hoisting building materials; Helicopter Winch Operators, Hoisting building materials; Hoes (All types); Hoists (with two or more drums in use); Horizontal Directional Drill; Hydraulic Gantry (lift system); Laser Finishing Machines; Laser Screed and like equipment; Lift Slab or Panel Jack Operators; Locomotives (all types); Maintenance Operator/Technician(Mechanic Operator/Technician and/or Welder); Mixers, paving (multiple drum); Mobile Concrete Pumps, with booms; Panelboards, (all types on site); Pile Drivers; Power Shovels; Prentice Loader; Rail Tamper (with automatic lifting and aligning device); Rotary Drills (all), used on caissons for foundations and sub-structure; Side Booms; Slip Form Pavers; Straddle Carriers (Building Construction on site); Trench Machines (over 24" wide); Tug Boats.

Group B - Articulating/end dumps (minus \$4.00/hour from Group B rate); Asphalt Pavers; Bobcat-type and/or skid steer loader with hoe attachment greater than 7000 lbs.; Bulldozers; CMI type Equipment; Concrete Saw, Vermeer-type; Endloaders; Hydro Milling Machine; Kolman-type Loaders (Dirt Loading); Lead Greasemen; Mucking Machines; Pettibone-Rail Equipment; Power Graders; Power Scoops; Power Scrapers; Push Cats;;

Rotomills (all), grinders and planers of all types.

Group C - A-Frames; Air Compressors, Pressurizing Shafts or Tunnels; All Asphalt Rollers; Bobcat-type and/or Skid Steer Loader with or without attachments; Boilers (15 lbs. pressure and over); All Concrete Pumps (without booms with 5 inch system); Fork Lifts (except masonry); Highway Drills - all types (with integral power); Hoists (with one drum); House Elevators (except those automatic call button controlled), Buck Hoists, Transport Platforms, Construction Elevators; Hydro Vac/Excavator (when a second person is needed, the rate of pay will be "Class E"); Man Lifts; Material hoist/elevators; Mud Jacks; Pressure Grouting; Pump Operators (installing or operating Well Points or other types of Dewatering Systems); Pumps (4 inches and over discharge); Railroad Tie (Inserter/Remover); Rotovator (Lime-Soil Stabilizer); Submersible Pumps (4" and over discharge); Switch & Tie Tampers (without lifting and aligning device); Trench Machines (24" and under); Utility Operators.

Group D - Backfillers and Tampers; Ballast Re-locator; Batch Plant Operators; Bar and Joint Installing Machines; Bull Floats; Burlap and Curing Machines; Clefplanes; Compressors, on building construction; Concrete Mixers, more than one bag capacity; Concrete Mixers, one bag capacity (side loaders); All Concrete Pumps (without boom with 4" or smaller system); Concrete Spreader; Conveyors, used for handling building materials; Crushers; Deckhands; Drum Fireman (in asphalt plants); Farm type tractors pulling attachments; Finishing Machines; Form Trenchers; Generators; Guniting Machines; Hydro-seeders; Pavement Breakers (hydraulic or cable); Post Drivers; Post Hole Diggers; Pressure Pumps (over 1/2" discharge); Road Widening Trenchers; Rollers (except asphalt); Self-propelled sub-graders; Shotcrete Machines; Tire Repairmen; Tractors, pulling sheepsfoot post roller or grader; VAC/ALLS; Vibratory Compactors, with integral power; Welders.

Group E - Allen Screed Paver (concrete); Boilers (less than 15 lbs. pressure); Cranes-Compact, track or rubber (under 4,000 pounds capacity); Directional Drill "Locator"; Fueling and greasing +\$3.00; Inboard/outboard Motor Boat Launches; Light Plant Operators; Masonry Fork Lifts; Oilers/Helpers; Power Driven Heaters (oil fired); Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signaller, Submersible Pumps (under 4" discharge).

Master Mechanics - Master Mechanic

Cranes 150' – 180' - Boom & Jib 150 - 180 feet

Cranes 180' – 249' - Boom & Jib 180 - 249 feet

Cranes 250' and over - Boom & Jib 250-feet or over

Name of Union: Operating Engineers - Hwy Zone II

Craft : Operating Engineer Effective Date : **06/05/2024** Last Posted : **06/05/2024**

[illegible]

1st year	50.00	\$22.07	\$9.26	\$6.25	\$0.90	\$0.00	\$0.00	\$0.09	\$0.00	\$0.10	\$38.67	\$49.71
2nd year	60.00	\$26.48	\$9.26	\$6.25	\$0.90	\$0.00	\$0.00	\$0.09	\$0.00	\$0.10	\$43.08	\$56.33
3rd year	70.00	\$30.90	\$9.26	\$6.25	\$0.90	\$0.00	\$0.00	\$0.09	\$0.00	\$0.10	\$47.50	\$62.95
4th year	80.00	\$35.31	\$9.26	\$6.25	\$0.90	\$0.00	\$0.00	\$0.09	\$0.00	\$0.10	\$51.91	\$69.57

Special Calculation Note : Other: Education & Safety Fund

Misc: National Training

Ratio :

For every (3) Operating Engineer Journeymen employed by the company, there may be employed (1) Registered Apprentice or Trainee Engineer through the referral when they are available. An Apprentice, while employed as part of a crew per Article VIII, paragraph 65 will not be subject to the apprenticeship ratios in this collective bargaining agreement

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LUCAS, MADISON, MARION, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TUSCARAWAS, UNION, VAN WERT, VINTON, WARREN, WASHINGTON, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

****Apprentices** will receive a 10% increase on top of the percentages listed above provided they are operating mobile equipment. **Mechanic Trainees** will receive 10% increase if they are required to have CDL.

Class A - Air Compressors on Steel Erection; Asphalt Plant Engineers (Cleveland District Only); Barrier Moving Machine; Boiler Operators, Compressor Operators, or Generators, when mounted on a rig; Boom Trucks (all types); Cableways; Cherry Pickers; Combination- Concrete Mixers & Towers; Concrete Plants (over 4 yd capacity); Concrete Pumps; Cranes (all types); Compact Cranes track or rubber over 4,000 pounds capacity; Cranes self-erecting stationary, track or truck; Derricks (all types); Draglines; Dredges dipper, clam or suction; Elevating Graders or Euclid Loaders; Floating Equipment (all types); Gradalls; Helicopter Crew (Operator- hoist or winch); Hoes (all types); Hoisting Engines; Hoisting Engines, on shaft or tunnel work; Hydraulic Gantry (lifting system); Industrial-type Tractors; Jet Engine Dryer (D8 or D9) diesel Tractors; Locomotives (standard gauge); Maintenance Operators/Technicians (class A); Mixers, paving (single or double drum); Mucking Machines; Multiple Scrapers; Piledriving Machines (all types); Power Shovels, Prentice Loader; Quad 9 (double pusher); Rail Tamper (with automatic lifting and aligning device); Refrigerating Machines (freezer operation); Rotary Drills, on caisson work; Rough Terrain Fork Lift with winch/hoist; Side Booms; Slip Form Pavers; Survey Crew Party Chiefs; Tower Derricks; Tree Shredders; Trench Machines (over 24" wide); Truck Mounted Concrete Pumps; Tug Boats; Tunnel Machines and /or Mining Machines; Wheel Excavators.

Class B - Asphalt Pavers; Automatic Subgrade Machines, self-propelled (CMI-type); Bobcat-type and /or Skid Steer Loader with hoe attachment greater than 7000 lbs.; Boring Machine Operators (more than 48 inches); Bulldozers; Concrete Saws, Vermeer type; Endloaders; Horizontal Directional Drill (50,000 ft. lbs. thrust and

over); Hydro Milling Machine; Kolman-type Loaders (production type-dirt); Lead Greasemen; Lighting and Traffic Signal Installation Equipment includes all groups or classifications; Maintenance Operators/Technicians, Class B; Material Transfer Equipment (shuttle buggy) Asphalt; Pettibone-Rail Equipment; Power Graders; Power Scrapers; Push Cats; Rotomills (all), Grinders and Planners of all types, Groovers (excluding walk-behinds); Trench Machines (24 inch wide and under).

Class C - A-Frames; Air Compressors, on tunnel work (low Pressure); Articulating/straight bed end dumps if assigned (minus \$4.00 per hour); Asphalt Plant Engineers (Portage and Summit Counties only); Bobcat-type and/or skid steer loader with or without attachments; Drones; Highway Drills (all types); HydroVac/Excavator (when a second person is needed, the rate of pay will be "Class E"); Locomotives (narrow gauge); Material Hoist/Elevators; Mixers, concrete (more than one bag capacity); Mixers, one bag capacity (side loader); Power Boilers (over 15 lbs. pressure); Pump Operators (installing or operating well Points); Pumps (4 inch and over discharge); Railroad Tie Inserter/Remover; Rollers, Asphalt; Rotovator (lime-soil Stabilizer); Switch & Tie Tampers (without lifting and aligning device); Utilities Operators, (small equipment); Welding Machines and Generators.

Class D – Backfillers and Tampers; Ballast Re-locator; Bar and Joint Installing Machines; Batch Plant Operators; Boring Machine Operators (48 inch or less); Bull Floats; Burlap and Curing Machines; Concrete Plants (capacity 4 yds. and under); Concrete Saws (multiple); Conveyors (highway); Crushers; Deckhands; Farm type tractors, with attachments (highway); Finishing Machines; Firemen, Floating Equipment (all types); Fork Lifts (highway), except masonry; Form Trenchers; Hydro Hammers; Hydro Seeders; Pavement Breakers (hydraulic or cable); Plant Mixers; Post Drivers; Post Hole Diggers; Power Brush Burners; Power Form Handling Equipment; Road Widening Trenchers; Rollers (brick, grade, macadam); Self-Propelled Power Spreaders; Self-Propelled Sub-Graders; Steam Firemen; Survey Instrument men; Tractors, pulling sheepsfoot rollers or graders; Vibratory Compactors, with integral power.

Class E - Compressors (portable, Sewer, Heavy and Highway); Cranes-Compact, track or rubber under 4,000 pound capacity; Drum Firemen (asphalt plant); Fueling and greasing (Primary Operator with Specialized CDL Endorsement Add \$3.00/hr); Generators; Inboard-Outboard Motor Boat Launches; Masonry Fork Lifts; Oil Heaters (asphalt plant); Oilers/Helpers; Power Driven Heaters (oil fired); Power Scrubbers; Power Sweepers; Pumps (under 4 inch discharge); Signaller; Survey Rodmen or Chairmen; Tire Repairmen; VAC/ALLS.

Master Mechanic - Master Mechanic

Cranes and Mobile Concrete Pumps 150' -179' - Boom & Jib 150 - 179 feet

Cranes and Mobile Concrete Pumps 180' - 249' - Boom & Jib 180 - 249 feet

Cranes and Mobile Concrete Pumps 250' and over - Boom & Jib 250 feet or over

Prevailing Wage Rate

Skilled Crafts

Name of Union: Painter Local 639 Zone 2 Sign

Change # : LCN01-2023ibLoc639

Craft : Painter Effective Date : 03/22/2023 Last Posted : 03/22/2023

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Painter Sign Journeyman Tech/Team Leader Class A	\$25.28	\$1.70	\$0.21	\$0.00	\$0.00	\$0.00	\$0.68	\$0.00	\$0.00	\$27.87	\$40.51
Painter Sign Journeyman Tech/Team Leader Class B	\$25.28	\$1.70	\$0.21	\$0.00	\$0.49	\$0.00	\$0.68	\$0.00	\$0.00	\$28.36	\$41.00
Painter Sign Journeyman Tech/Team Leader Class C	\$25.28	\$1.70	\$0.21	\$0.00	\$0.97	\$0.00	\$0.68	\$0.00	\$0.00	\$28.84	\$41.48
Painter Sign Journeyman Tech/Team Leader Class D	\$25.28	\$1.70	\$0.21	\$0.00	\$1.46	\$0.00	\$0.68	\$0.00	\$0.00	\$29.33	\$41.97
Sign Journeyman Class A	\$25.00	\$1.70	\$0.21	\$0.00	\$0.00	\$0.00	\$0.67	\$0.00	\$0.00	\$27.58	\$40.08
Sign Journeyman Class B	\$25.00	\$1.70	\$0.21	\$0.00	\$0.48	\$0.00	\$0.67	\$0.00	\$0.00	\$28.06	\$40.56
Sign Journeyman Class C	\$25.00	\$1.70	\$0.21	\$0.00	\$0.96	\$0.00	\$0.67	\$0.00	\$0.00	\$28.54	\$41.04
Sign Journeyman Class D	\$25.00	\$1.70	\$0.21	\$0.00	\$1.44	\$0.00	\$0.67	\$0.00	\$0.00	\$29.02	\$41.52
Tech Sign Fabrication/ Erector Class A	\$19.67	\$1.70	\$0.21	\$0.00	\$0.00	\$0.00	\$0.53	\$0.00	\$0.00	\$22.11	\$31.95

Tech Sign Fabrication/ Erector Class B	\$19.67	\$1.70	\$0.21	\$0.00	\$0.38	\$0.00	\$0.53	\$0.00	\$0.00	\$22.49	\$32.33
Tech Sign Fabrication/ Erector Class C	\$19.67	\$1.70	\$0.21	\$0.00	\$0.76	\$0.00	\$0.53	\$0.00	\$0.00	\$22.87	\$32.71
Tech Sign Fabrication/ Erector Class D	\$19.67	\$1.70	\$0.21	\$0.00	\$1.13	\$0.00	\$0.53	\$0.00	\$0.00	\$23.24	\$33.08

Special Calculation Note : Other is for paid holidays.

Ratio :

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, AUGLAIZE, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GREENE, HAMILTON, HANCOCK, HARDIN, HENRY, HIGHLAND, HOLMES, HURON, JACKSON, KNOX, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MERCER, MIAMI, MONTGOMERY, MORROW, MUSKINGUM, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PREBLE, PUTNAM, ROSS, SANDUSKY, SCIOTO, SENECA, SHELBY, STARK, TRUMBULL, TUSCARAWAS, UNION, VAN WERT, WARREN, WAYNE, WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Class A: less than 1 year.

Class B: 1-3 years.

Class C; 3-10 years.

Class D: More than 10 years.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Painter Local 639

Change # : LCNO1-2015fbLoc639

Craft : Painter Effective Date : 06/10/2015 Last Posted : 06/10/2015

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Painter Metal Finisher/Helpers											
Top Helper Class A	\$19.09	\$3.65	\$0.00	\$0.00	\$0.66	\$0.00	\$0.00	\$0.00	\$0.00	\$23.40	\$32.94
Top Helper Class B	\$19.09	\$3.65	\$0.65	\$0.00	\$1.03	\$0.00	\$0.37	\$0.00	\$0.00	\$24.79	\$34.33
Top Helper Class C	\$19.09	\$3.65	\$1.00	\$0.00	\$1.76	\$0.00	\$0.37	\$0.00	\$0.00	\$25.87	\$35.41
Helper Class A	\$14.69	\$3.65	\$0.00	\$0.00	\$0.51	\$0.00	\$0.00	\$0.00	\$0.00	\$18.85	\$26.19
Helper Class B	\$14.69	\$3.65	\$0.65	\$0.00	\$0.79	\$0.00	\$0.28	\$0.00	\$0.00	\$20.06	\$27.40
Helper Class C	\$14.69	\$3.65	\$1.00	\$0.00	\$1.64	\$0.00	\$0.28	\$0.00	\$0.00	\$21.26	\$28.60
New Hire 90 Days	\$11.00	\$3.65	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$14.65	\$20.15

Special Calculation Note : Other is Sick and Personal Time

Ratio :

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, CUYAHOGA, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GEAUGA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAKE, LAWRENCE, LICKING, LOGAN, LORAIN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW, MUSKINGUM, NOBLE, OTTAWA, PAULDING, PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE, PUTNAM, RICHLAND, ROSS, SANDUSKY,

SCIOTO, SENECA, SHELBY, STARK, SUMMIT,
TRUMBULL, TUSCARAWAS, UNION, VAN WERT,
VINTON, WARREN, WASHINGTON, WAYNE,
WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Top Helper: Shall perform the responsibilities of a Helper and be responsible for the setup, break down, safety and quality of the company's product.

Helper : Shall be responsible for performing tasks in refinishing, compliance with safety procedures, setting up and breaking down job sites, scaffolding and swing stages and preparing surfaces for refinishing including but not limited to, masking and stripping and cleaning, oxidizing, polishing and scratch removal on various surfaces

Class A Workers: Less than 1 Year of Service.

Class B Workers: More than 1 and less than 8 Years of Service.

Class C Workers: More than 8 Years of Service.

Metal Polisher Scope of Work: Polishing, buffing, stripping, coloring, lacquering, spraying, cleaning and maintenance of ornamental and architectural metals, iron, bronze, nickel, aluminum and stainless steel and in mental specialty work, various stone finishes, stone specialty work and any other work pertaining to the finishing of metal, stones, woods, and any window washing/cleaning done in conjunction with this work, using chemicals, solvents, coatings and hand applied lacquer thinner, removing scratches from mirror finished metals, burnishing of bronze, statuary finishes on exterior and interior surfaces and the use of all tools required to perform such work, including but not limited to polishes, spray equipment and scaffolding.

Swing State Rate: All work on scaffold 4 sections or higher, including any boom lifts and swing stage scaffolds including the rigging and derigging of hanging/suspended swing stage systems and rappelling/bolson chair work, ADD \$1.50 per hour.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Painter Local 1275

Change # : LCN01-2024ibLoc1275

Craft : Drywall Finisher Effective Date : 05/08/2024 Last Posted : 05/08/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Drywall Finisher	\$30.85		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.11	\$61.54
Drywall Taper	\$30.85		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.11	\$61.54
Drywall Sanders	\$30.20		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.46	\$60.56
Drywall, Use of Mechanical or Pneumatic Tools	\$31.60		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.86	\$62.66
Apprentice	Percent											
1st 0-1500 hrs	80.00	\$24.68	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$32.40	\$44.74
2nd 1501-3000 hrs	85.00	\$26.22	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$33.94	\$47.05
3rd 3001-4500 hrs	90.00	\$27.76	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$35.49	\$49.37
4th 4501-6000 hrs	95.00	\$29.31	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$37.03	\$51.68

Special Calculation Note :

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, KNOX, LICKING, MADISON, MUSKINGUM, PERRY, PICKAWAY, ROSS, UNION

Special Jurisdictional Note :

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Painter Local 1275

Change # : LCN01-2024ibLoc1275

Craft : Painter Effective Date : 05/08/2024 Last Posted : 05/08/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Brush Roll	\$29.20		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.46	\$59.06
Wall Washer	\$29.20		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.46	\$59.06
Spray	\$29.70		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.96	\$59.81
Structural Steel Swing Stage	\$29.50		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.76	\$59.51
Sandblast, Steam Clean, Water Blasting (3500 PSI and Over) and Hazardous	\$29.90		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.16	\$60.11
Vinyl Hanging	\$29.70		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.96	\$59.81
Apprentice	Percent											
0-1500 hrs	80.00	\$23.36	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$31.08	\$42.76
1501-3000 hrs	85.00	\$24.82	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$32.54	\$44.95
3001-4500 hrs	90.00	\$26.28	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$34.00	\$47.14
4501-6000 hrs	95.00	\$27.74	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$35.46	\$49.33

Special Calculation Note :

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, KNOX, LICKING, MADISON, MUSKINGUM, PERRY, PICKAWAY, ROSS, UNION

Special Jurisdictional Note :

Details :

Heavy Highway Class 1 are qualified painters,blasters,riggers.

Class 2 Equipment Tenders /or containment Builders are hired to tend employers equipment also engage in the building & moving of containment systems.

Class 3 support personnel will perform Quality control duties,clean abrasive blast materials, load and unload trucks, handle all materials, man safety boats, & handle traffic control.

All Tanks 50,000 gallon capacity or more will be at the tank stated rate.

Blasting Power Washing												
Painter Bridges Class 5 Quality Control, Quality Assurance, Traffic Safety Competent Person	\$32.26	\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$47.52	\$63.65
Apprentice	Percent											
1st 0-1500 hrs	80.00	\$31.41	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$39.13	\$54.83
2nd 1501- 3000 hrs	85.00	\$33.37	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$41.09	\$57.78
3rd 3001- 4500 hrs	90.00	\$35.33	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.05	\$60.72
4th 4501-6000 hrs	95.00	\$37.30	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.02	\$63.67

Special Calculation Note :

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN,
KNOX, LICKING, MADISON, MUSKINGUM,
PERRY, PICKAWAY, ROSS, UNION

Special Jurisdictional Note :

Details :

Heavy Highway Class 1 are qualified painters,blasters,riggers. Class 2 Equipment Tenders /or containment Builders are hired to tend employers equipment also engage in the building & moving of containment systems. Class 3 support personnel will perform Quality control duties, clean abrasive blast materials, load and unload trucks, handle all materials, man safety boats, & handle traffic control.

Prevailing Wage Rate Skilled Crafts

Name of Union: Painter Local 1275 Industrial

Change # : LCN01-2023ibLoc1275

Craft : Painter Effective Date : 05/08/2024 Last Posted : 05/08/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Painter Brush Roll	\$30.65		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.91	\$61.24
Power Tool Cleaningr	\$30.65		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.91	\$61.24
Spray Painting	\$31.15		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.41	\$61.99
Sand Blast, Steam Clean & Pressure Washing Above 3500 PSI	\$31.35		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.61	\$62.29
Stacks and towers	\$33.46		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.72	\$65.45
Tanks - All Tanks 50,000 gallon capacity or more	\$33.46		\$6.50	\$8.31	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.72	\$65.45
Apprentice	Percent											
0-1500 hrs	80.00	\$24.52	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$32.24	\$44.50
1501-3000 hrs	85.00	\$26.05	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$33.77	\$46.80
3001-4500 hrs	90.00	\$27.58	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$35.31	\$49.10
4501-6000 hrs	95.00	\$29.12	\$6.50	\$0.77	\$0.45	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$36.84	\$51.40

Special Calculation Note :

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, KNOX, LICKING, MADISON, MUSKINGUM,

Special Jurisdictional Note :

Details :

Definition of Industrial Classification:

Industrial Facilities to be included in the Industrial Classification shall include; Water Treatment, Waste Water Treatment, Natural Gas and related facilities, refineries, transmission pipe lines, electrical transmission towers and or switching /sub stations and Power Plants.

Exclusions from the industrial classification are Power Plants that generate power to a single customer; such as an emergency power supplier or a Hospital, Information Technology Facility, Sporting/Event or Arena/Stadium type facility. This exclusion would also be given to any commercial office space located within the facilities property. The excluded spaces shall be done under the Commercial Wage rates.

Prevailing Wage Rate Skilled Crafts

Name of Union: Plasterer Local 132 (Columbus)

Change # : LCN01-2024ibLoc132

Craft : Plasterer Effective Date : 06/01/2024 Last Posted : 05/29/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Plasterer	\$30.54		\$7.65	\$4.40	\$0.50	\$0.00	\$2.00	\$0.05	\$0.00	\$0.00	\$45.14	\$60.41
Apprentice	Percent											
1st 800 hrs	70.00	\$21.38	\$7.65	\$4.40	\$0.50	\$0.00	\$2.00	\$0.05	\$0.00	\$0.00	\$35.98	\$46.67
2nd 800 hrs	74.00	\$22.60	\$7.65	\$4.40	\$0.50	\$0.00	\$2.00	\$0.05	\$0.00	\$0.00	\$37.20	\$48.50
3rd 800 hrs	78.00	\$23.82	\$7.65	\$4.40	\$0.50	\$0.00	\$2.00	\$0.05	\$0.00	\$0.00	\$38.42	\$50.33
4th 800 hrs	82.00	\$25.04	\$7.65	\$4.40	\$0.50	\$0.00	\$2.00	\$0.05	\$0.00	\$0.00	\$39.64	\$52.16
5th 800 hrs	86.00	\$26.26	\$7.65	\$4.40	\$0.50	\$0.00	\$2.00	\$0.05	\$0.00	\$0.00	\$40.86	\$54.00
6th 800 hrs	90.00	\$27.49	\$7.65	\$4.40	\$0.50	\$0.00	\$2.00	\$0.05	\$0.00	\$0.00	\$42.09	\$55.83
7th 800 hrs	94.00	\$28.71	\$7.65	\$4.40	\$0.50	\$0.00	\$2.00	\$0.05	\$0.00	\$0.00	\$43.31	\$57.66
8th 800 hrs	98.00	\$29.93	\$7.65	\$4.40	\$0.50	\$0.00	\$2.00	\$0.05	\$0.00	\$0.00	\$44.53	\$59.49

Special Calculation Note : *Other is International Training Fund

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ASHLAND, COSHOCTON, CRAWFORD, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GUERNSEY, HOCKING, KNOX, LICKING, MADISON, MARION, MORROW, MUSKINGUM, PERRY, PICKAWAY, RICHLAND, ROSS, UNION, VINTON, WYANDOT

Special Jurisdictional Note :

Details :

PLASTERER IMPROVERS:

Is a person who has skills between an Apprentice and a Journeyman can be signed in as an Improver. An Improver receives 85% of the current wage and pension. All other benefits are same as Journeyman. The Improver has the opportunity to advance to Journeyman level by:

- (1) Working through a trial period of no more than 2,000 hrs.
- (2) Attending all safety and upgrading classes held or required.

Working on swing stage, slip scaffold or window jack scaffold shall receive the following rates:
\$.50 above the regular rate for heights up to fifty (50) feet above grade level

\$1.00 above the regular rate for heights over fifty (50) feet above grade level

Prevailing Wage Rate Skilled Crafts

Name of Union: Plumber Pipefitter Local 189

Change # : LCN01-2023ibLoc189

Craft : Plumber Pipefitter Effective Date : 06/01/2023 Last Posted : 05/31/2023

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Plumber Pipefitter	\$46.25		\$10.39	\$7.49	\$1.45	\$0.00	\$7.76	\$0.00	\$0.00	\$0.00	\$73.34	\$96.46
Heating Piping Refrigeration, Temperature Control, Air Conditioning Welder	\$46.25		\$10.39	\$7.49	\$1.45	\$0.00	\$7.76	\$0.00	\$0.00	\$0.00	\$73.34	\$96.46
1st Year	45.00	\$20.81	\$5.00	\$0.00	\$1.45	\$0.00	\$0.00	\$0.10	\$0.00	\$0.00	\$27.36	\$37.77
2nd Year	50.02	\$23.13	\$10.39	\$5.60	\$1.45	\$0.00	\$0.00	\$0.10	\$0.00	\$0.00	\$40.67	\$52.24
3rd Year	55.00	\$25.44	\$10.39	\$5.60	\$1.45	\$0.00	\$0.00	\$0.10	\$0.00	\$0.00	\$42.98	\$55.70
4th Year	65.00	\$30.06	\$10.39	\$5.60	\$1.45	\$0.00	\$5.76	\$0.10	\$0.00	\$0.00	\$53.36	\$68.39
5th Year	80.00	\$37.00	\$10.39	\$5.60	\$1.45	\$0.00	\$7.76	\$0.10	\$0.00	\$0.00	\$62.30	\$80.80

Special Calculation Note : *Other is International Training

Ratio :

Employees-----Journeyman to Apprentice
per Job

- 1) 1-0
- 2) 1-1
- 3) 2-1
- 4) 2-2
- 5) 3-2
- 6) 4-2
- 7) 4-3
- 8) 5-3
- 9) 6-3
- 10) 6-4
- 11) 7-4
- 12) 8-4
- 13) 8-5
- 14) 9-5
- 15) 10-5

Jurisdiction (* denotes special jurisdictional note) :

DELAWARE, FAIRFIELD, FRANKLIN, HOCKING, LICKING, MADISON, MARION, PERRY, PICKAWAY, ROSS, UNION

- 16) 10-6
- 17) 11-6
- 18) 12-6
- 19) 12-7
- 20) 13-7
- 21) 14-7
- 22) 14-8
- 23) 15-8
- 24) 16-8
- 25) 16-9

Heating Piping refrigeration, Temperature Control, Air
Conditioning Ratio

(1) Additional Apprentice to (3) Journeymen thereafter
Employees Journeyman to Apprentice
per Job

- 1) Employee 1-0
- 2) Employees 1-1
- 3) Employees 2-1
- 4) Employees 2-2
- 5) Employees 3-2
- 6) Employees 4-2
- 7) Employees 5-2
- 8) Employees 5-3
- 9) Employees 6-3
- 10) Employees 7-3
- 11) Employees 8-3
- 12) Employees 8-4
- 13) Employees 9-4
- 14) Employees 10-4
- 15) Employees 11-4
- 16) Employees 11-5
- 17) Employees 12-5
- 18) Employees 13-5
- 19) Employees 14-5
- 20) Employees 14-6
- 21) Employees 15-6
- 22) Employees 17-5
- 23) Employees 18-5
- 24) Employees 18-6
- 25) Employees 19-6
- 26) Employees 20-6
- 28) Employees 22-6
- 29) Employees 22-7
- 30) Employees 23-7
- 31) Employees 23-7
- 32) Employees 25-7
- 33) Employees 26-7
- 34) Employees 26-8

Special Jurisdictional Note :

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Roofer Local 86

Change # : LCN01-2023ibLoc86

Craft : Roofer Effective Date : 09/13/2023 Last Posted : 09/13/2023

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Roofer	\$33.17		\$8.20	\$7.40	\$0.54	\$0.00	\$0.30	\$0.06	\$0.00	\$0.00	\$49.67	\$66.26
Apprentice	Percent											
1st YEAR	65.00	\$21.56	\$0.00	\$0.00	\$0.54	\$0.00	\$0.25	\$0.06	\$0.00	\$0.00	\$22.41	\$33.19
2nd YEAR	70.00	\$23.22	\$8.20	\$1.85	\$0.54	\$0.00	\$0.25	\$0.06	\$0.00	\$0.00	\$34.12	\$45.73
3rd YEAR	75.00	\$24.88	\$8.20	\$3.33	\$0.54	\$0.00	\$0.25	\$0.06	\$0.00	\$0.00	\$37.26	\$49.70
4th YEAR	85.00	\$28.19	\$8.20	\$4.81	\$0.54	\$0.00	\$0.25	\$0.06	\$0.00	\$0.00	\$42.05	\$56.15

Special Calculation Note : International Training/Education/Research Fund.

Ratio :

1 Journeymen to 1 Apprentices
per job site

Jurisdiction (* denotes special jurisdictional note) :

CHAMPAIGN, DELAWARE, FAIRFIELD, FAYETTE,
FRANKLIN, HARDIN, HOCKING, KNOX,
LICKING, LOGAN, MADISON, MARION,
MORROW, PERRY, PICKAWAY, PIKE, ROSS,
UNION, WYANDOT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Sheet Metal Local 24 Columbus

Change # : LCN01-2024ibLoc24Col

Craft : Sheet Metal Worker Effective Date : 04/24/2024 Last Posted : 04/24/2024

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Sheet Metal Worker	\$36.10	\$9.88	\$12.28	\$1.19	\$0.00	\$3.82	\$0.00	\$0.00	\$0.00	\$63.27	\$81.32
Apprentice	Percent										
1st Year	57.00	\$20.58	\$8.07	\$2.14	\$0.98	\$0.00	\$0.00	\$0.00	\$0.00	\$31.77	\$42.06
2nd Year	65.00	\$23.47	\$9.26	\$7.98	\$0.98	\$0.00	\$0.00	\$0.00	\$0.00	\$41.68	\$53.42
3rd Year	75.00	\$27.08	\$9.49	\$9.21	\$1.19	\$0.00	\$2.87	\$0.00	\$0.00	\$49.84	\$63.37
4th Year	85.02	\$30.69	\$9.64	\$10.44	\$1.19	\$0.00	\$3.25	\$0.00	\$0.00	\$55.21	\$70.56

Special Calculation Note : No special calculations for this skilled craft wage rate required at this time.

Ratio :

1 Journeyman to 1 Apprentice
 2-8 Journeymen to 2 Apprentices
 9-11 Journeymen to 3 Apprentices
 12-14 Journeymen to 4 Apprentices
 15-17 Journeymen to 5 Apprentices
 18-20 Journeymen to 6 Apprentices
 21-23 Journeyman to 7 Apprentices
 24-26 Journeyman to 8 Apprentices
 27-29 Journeymen to 9 Apprentices
 30-32 Journeymen to 10 Apprentices
 33-35 Journeymen to 11 Apprentices
 36-38 Journeymen to 12 Apprentices
 39-41 Journeymen to 13 Apprentices
 42-44 Journeymen to 14 Apprentices
 45-47 Journeymen to 15 Apprentices
 48-50 Journeymen to 16 Apprentices
 and so on

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ATHENS, DELAWARE, FAIRFIELD, FAYETTE, FRANKLIN, GALLIA, GUERNSEY, HOCKING, JACKSON, KNOX, LAWRENCE, LICKING, MADISON, MARION, MEIGS, MORGAN, MORROW, MUSKINGUM, NOBLE, PERRY, PICKAWAY, PIKE, ROSS, SCIOTO, UNION, VINTON

Special Jurisdictional Note :

Details :

Prevailing Wage Rate Skilled Crafts

Name of Union: Sprinkler Fitter Local 669

Change # : LCN01-2022sksLoc669

Craft : Sprinkler Fitter Effective Date : 04/06/2022 Last Posted : 04/06/2022

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Sprinkler Fitter	\$43.75		\$10.99	\$7.10	\$0.52	\$0.00	\$5.12	\$0.00	\$0.00	\$0.00	\$67.48	\$89.35
Apprentice Indentured after April 1, 2013	Percent											
CILASS 1	45.00	\$19.69	\$7.85	\$0.00	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$28.06	\$37.90
CLASS 2	50.02	\$21.88	\$7.85	\$0.00	\$0.52	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$30.25	\$41.20
CLASS 3	54.43	\$23.81	\$10.99	\$7.10	\$0.52	\$0.00	\$1.15	\$0.00	\$0.00	\$0.00	\$43.57	\$55.48
CLASS 4	59.43	\$26.00	\$10.99	\$7.10	\$0.52	\$0.00	\$1.15	\$0.00	\$0.00	\$0.00	\$45.76	\$58.76
CLASS 5	64.43	\$28.19	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$48.20	\$62.29
CLASS 6	69.43	\$30.38	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$50.39	\$65.57
CLASS 7	74.43	\$32.56	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$52.57	\$68.85
CLASS 8	79.42	\$34.75	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$54.76	\$72.13
CLASS 9	84.43	\$36.94	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$56.95	\$75.42
CLASS 10	89.44	\$39.13	\$10.99	\$7.10	\$0.52	\$0.00	\$1.40	\$0.00	\$0.00	\$0.00	\$59.14	\$78.70

Special Calculation Note :

Ratio :

1 Journeyman to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE, GUERNSEY, HAMILTON, HANCOCK, HARDIN, HARRISON, HENRY, HIGHLAND, HOCKING, HOLMES, HURON, JACKSON, JEFFERSON, KNOX, LAWRENCE, LICKING, LOGAN, LUCAS, MADISON, MAHONING, MARION, MEDINA, MEIGS, MERCER, MIAMI, MONROE, MONTGOMERY, MORGAN, MORROW,

MUSKINGUM, NOBLE, OTTAWA, PAULDING,
PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE,
PUTNAM, RICHLAND, ROSS, SANDUSKY,
SCIOTO, SENECA, SHELBY, STARK, SUMMIT,
TRUMBULL, TUSCARAWAS, UNION, VAN WERT,
VINTON, WARREN, WASHINGTON, WAYNE,
WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Sprinkler Fitter work shall consist of the installation, dismantling, maintenance, repairs, adjustments, and corrections of all fire protection and fire control systems including the unloading, handling by hand, power equipment and installation of all piping or tubing, appurtenances and equipment pertaining thereto, including both overhead and underground water mains, fire hydrants and hydrant mains, standpipes and hose connections to sprinkler systems used in connection with sprinkler and alarm systems. Also all tanks and pumps connected thereto, also included shall be CO-2 and Cardox Systems, Dry Chemical Systems, Foam Systems and all other fire protection systems.

Prevailing Wage Rate

Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 1
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : LCN01-2024ibBldgHevHwy

Craft : Truck Driver **Effective Date :** 05/01/2024 **Last Posted :** 05/01/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Truck Driver CLASS 1 4 wheel service, dump, and batch trucks; drivers on tandems; truck sweepers (not to include power sweepers & scrubbers)	\$31.84		\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.84	\$65.76
Apprentice	Percent											
First 6 months	80.00	\$25.47	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$43.47	\$56.21
7-12 months	85.00	\$27.06	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$45.06	\$58.60
13-18 months	90.00	\$28.66	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.66	\$60.98
19-24 months	95.00	\$30.25	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$48.25	\$63.37
25-30 months	100.00	\$31.84	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.84	\$65.76

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK,

CLERMONT, CLINTON, COLUMBIANA,
COSHOCTON, CRAWFORD, DARKE, DEFIANCE,
DELAWARE, ERIE, FAIRFIELD, FAYETTE,
FRANKLIN, FULTON, GALLIA, GREENE,
GUERNSEY, HAMILTON, HANCOCK, HARDIN,
HARRISON, HENRY, HIGHLAND, HOCKING,
HOLMES, HURON, JACKSON, JEFFERSON,
KNOX, LAWRENCE, LICKING, LOGAN, LORAIN,
LUCAS, MADISON, MAHONING, MARION,
MEDINA, MEIGS, MERCER, MIAMI, MONROE,
MONTGOMERY, MORGAN, MORROW,
MUSKINGUM, NOBLE, OTTAWA, PAULDING,
PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE,
PUTNAM, RICHLAND, ROSS, SANDUSKY,
SCIOTO, SENECA, SHELBY, STARK, SUMMIT,
TRUMBULL, TUSCARAWAS, UNION, VAN WERT,
VINTON, WARREN, WASHINGTON, WAYNE,
WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Truck Driver Bldg & Hwy Class 2
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : LCN01-2024ibBldgHwy

Craft : Truck Driver **Effective Date :** 05/01/2024 **Last Posted :** 05/01/2024

	BHR	Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
		H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification											
Truck Driver CLASS 2 Tractor Trailer-Semi Tractor Trucks; Pole Trailers; Ready Mix Trucks; Fuel Trucks; 5 Axle & Over; Belly Dumps; Low boys - Heavy duty Equipment(irrespective of load carried) when used exclusively for transportation; Truck Mechanics (when needed)	\$32.26	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$50.26	\$66.39
Apprentice	Percent										
First 6 months	80.00	\$25.81	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$43.81	\$56.71
7-12 months	85.00	\$27.42	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$45.42	\$59.13
13-18 months	90.00	\$29.03	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$47.03	\$61.55
19-24 months	95.00	\$30.65	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$48.65	\$63.97
25-30 months	100.00	\$32.26	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$50.26	\$66.39

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA,
 ATHENS, AUGLAIZE, BELMONT, BROWN,
 BUTLER, CARROLL, CHAMPAIGN, CLARK,
 CLERMONT, CLINTON, COLUMBIANA,
 COSHOCTON, CRAWFORD, DARKE, DEFIANCE,
 DELAWARE, ERIE, FAIRFIELD, FAYETTE,
 FRANKLIN, FULTON, GALLIA, GREENE,
 GUERNSEY, HAMILTON, HANCOCK, HARDIN,
 HARRISON, HENRY, HIGHLAND, HOCKING,
 HOLMES, HURON, JACKSON, JEFFERSON,

KNOX, LAWRENCE, LICKING, LOGAN, LORAIN,
LUCAS, MADISON, MAHONING, MARION,
MEDINA, MEIGS, MERCER, MIAMI, MONROE,
MONTGOMERY, MORGAN, MORROW,
MUSKINGUM, NOBLE, OTTAWA, PAULDING,
PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE,
PUTNAM, RICHLAND, ROSS, SANDUSKY,
SCIOTO, SENECA, SHELBY, STARK, SUMMIT,
TRUMBULL, TUSCARAWAS, UNION, VAN WERT,
VINTON, WARREN, WASHINGTON, WAYNE,
WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :

Prevailing Wage Rate

Skilled Crafts

Name of Union: Truck Driver Bldg & HevHwy Class 3
Locals 20,40,92,92b,100,175,284,438,377,637,908,957

Change # : LCN01-2024ibBldgHevHwy3

Craft : Truck Driver **Effective Date :** 05/01/2024 **Last Posted :** 05/01/2024

	BHR		Fringe Benefit Payments						Irrevocable Fund		Total PWR	Overtime Rate
			H&W	Pension	App Tr.	Vac.	Annuity	Other	LECET (*)	MISC (*)		
Classification												
Truck Driver CLASS 3 Articulated Dump Trucks; Ridge-Frame Rock Trucks; Distributor Trucks)	\$33.26		\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$51.26	\$67.89
Apprentice	Percent											
First 6 months	80.00	\$26.61	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$44.61	\$57.91
7-12 months	85.00	\$28.27	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$46.27	\$60.41
13-18 months	90.00	\$29.93	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$47.93	\$62.90
19-24 months	94.96	\$31.58	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$49.58	\$65.38
25-30 months	100.00	\$33.26	\$8.00	\$9.60	\$0.40	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$51.26	\$67.89

Special Calculation Note : No special calculations for this skilled craft wage rate are required at this time.

Ratio :

3 Journeymen to 1 Apprentice

Jurisdiction (* denotes special jurisdictional note) :

ADAMS, ALLEN, ASHLAND, ASHTABULA, ATHENS, AUGLAIZE, BELMONT, BROWN, BUTLER, CARROLL, CHAMPAIGN, CLARK, CLERMONT, CLINTON, COLUMBIANA, COSHOCTON, CRAWFORD, DARKE, DEFIANCE, DELAWARE, ERIE, FAIRFIELD, FAYETTE, FRANKLIN, FULTON, GALLIA, GREENE,

GUERNSEY, HAMILTON, HANCOCK, HARDIN,
HARRISON, HENRY, HIGHLAND, HOCKING,
HOLMES, HURON, JACKSON, JEFFERSON,
KNOX, LAWRENCE, LICKING, LOGAN, LORAIN,
LUCAS, MADISON, MAHONING, MARION,
MEDINA, MEIGS, MERCER, MIAMI, MONROE,
MONTGOMERY, MORGAN, MORROW,
MUSKINGUM, NOBLE, OTTAWA, PAULDING,
PERRY, PICKAWAY, PIKE, PORTAGE, PREBLE,
PUTNAM, RICHLAND, ROSS, SANDUSKY,
SCIOTO, SENECA, SHELBY, STARK, SUMMIT,
TRUMBULL, TUSCARAWAS, UNION, VAN WERT,
VINTON, WARREN, WASHINGTON, WAYNE,
WILLIAMS, WOOD, WYANDOT

Special Jurisdictional Note :

Details :